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OF THE

Southern California Academy of Sciences

Committee on Publication:

C. A. Whiting, Sc. D., D. O. A. Davidson, C. M., M. D. Wm. H. Knight

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TRANSACTIONS

BIOLOGICAL SECTION.

MARCH 24, 1906

The meeting was held in the Histological Laboratory of the Pacific College of Osteopathy.

In the absence of the Chairman the meeting was called to order by the Secretary and Mr. Barrow was called to the chair.

The subject of Structure and Innervation of the Tongue was presented by C. A. Whiting and some twenty or more prepared specimens, clearly showing the Structure and Innervation of this organ, were displayed under microscopes.

About twenty-five members and visitors were present.

On motion the meeting adjourned.

C. A. WHITING, Secretary.

February 12, 1906.

The Biological Section of the Southern California Academy of Sciences met for its regular monthly meeting.

In the absence of the Chairman of the Section, the meeting was called to order by the Secretary and the minutes of the last meeting were read and approved.

The lecture of the evening was given by Dr. Wm. Bebb and was illustrated by numerous stereopticon views. The lecture dealt with the comparative development and pathology of teeth and included a discussion of the teeth of domestic, wild and captive animals. Among the most interesting views presented were skulls of rabbits in which the incisor teeth had undergone enormous development because of the suppression of the teeth which ordinarily opposed them.

One of the most important facts brought out in the lecture was that "Hutchinson's Teeth" is not indicative of Syphilis, but that that peculiar conformation of teeth may be produced by measles, diphtheria, scarlet fever andpossibly other disorders.

The night was very stormy and only about twelve members and visitors were present.

C. A. WHITING, Secretary.

March 12, 1906.

BOOK REVIEW.

The sixth edition of the Microtomist's Vade-Mecum, by Arthur Bolles Lee, bearing the date of June, 1905, is at hand. Although not much larger than the fifth edition, it contains a considerable amount of new matter. This is due in part to a better arrangement of the text and in part to the substitution of new and improved methods for antiquated ones. Many of the chapters leave almost nothing for which one could wish. Though here and there seem to be some evidences of a lack of clearness due to a desire for condensation.

The severest criticism which one can pass upon the book is that in a number of places the reader is referred for further information upon the subject to the earlier editions. Reference to other literature may easily be justified, but it seldom happens that a reference to a previous edition of any work is justifiable.

It is perhaps not stating it too strongly to say that the work is absolutely necessary to the working histologist.

It is published by P. Blakiston's Son & Co., 1012 Walnut street, Philadelphia, Pa.

RECENT PUBLICATIONS.

"The Butterflies of the West Coast of the United States," by William Greenwood Wright, San Francisco, the Whitaker & Ray Co., 1905; pp. 257, VII, Pl. 1-32.

California has every reason to be proud of Mr. Wright's handsome quarto. Paper and presswork are of the best style of bookmaking, while the plates present the highest attainment of the art of photographic color printing. It is not too high praise to say of them that they equal in beauty, and excel in life-like accuracy, the hand colored plates of Edward's great work on the North American butterflies.

In interest and importance the matter is worthy of this fine dress. For twenty-five years the author has been a diligent student of the lepidoptera of western America. His field observations have been carried on from Alaska to Mexico, so that he knows intimably the life-history of almost every species that inhabits that vast territory. The work of so ripe a student, and in a field so little explored, the book is naturally full of new and valuable matter.

The first 32 pages are occupied with a discussion of the general features of butterfly life. This is succeeded by a complete list of the Butterflies of the United States, in which those of the western coast are distinguished by heavy-face type. This brings us to hte main body of the work; a description of all the known species and varieties of Butterflies on the Pacific slope. These number 483, and all but 53 of them are illustrated by from one to seven figures, portraying them in their natural colors and in different aspects. The descriptions, while sufficient, are not in technical form, but may be readily understood by any one. In connection with the pictures, this should enable one quite unacquainted with entomology to idtntify most of the butterflies he may see. In all there are 487 of these beautiful figures. Twenty-nine new species and varieties are here first published. There are also many interesting notes on the habits, range, and other facts connected with the life-history of the various species.

The book is destined to remain as the permanent foundation stone of our knowledge of the western American butterflies.

S. B. P.

RECENT PUBLICATIONS.

"North American Species of Agrostis," by A. S. Hitchcock. Bull. 68, Bureau Plant Industry, U. S. Dept. Agriculture, 1905. Pp. 68. Pl. 1-37.

The territory included in this revision extends from Labrador to the Valley of Mexico. The genus is seen to be poorly represented in this vast region, only 27 species being recognized by the author. For the most part it is a genus of the north, and southward occurs chiefly at high altitudes. While the paper is no mere study in nomenclature, the author has found reason for changing the names of all the Southern California species, except**A. alba**, L., and **A. microphylla**, teud. The Bear Valley grass which has passed as **A. æquivalvis**, Trin., is here considered to be **A. Rossæ**, Vosey, while another mountain grass, heretofore included in **A. scabra**, Willd., is here referred to **A. Scheidiana**, Trin. **A. scabra** itself, by the revival of an earlier specific name, becomes **A. hyemalis**, B. S. P. Sibthorp having previously used the name for another grass, Vasey's **A. tennis** takes the name **A. idadoensis**, Nash. **A. asperifolia**, Trin., of Abram's Flora, is included in the older **A. exarata**, Trin., as it was by Thurber, in the Botany of California. Finally, **A. Fiegoeusis**, Vasey, proves identical with the previously published **A. foliosa**, Vasey, but is here reduced to a variety, as **A. pallens foliosa,** Hitchc., and with it is included the **A. multicalmis** of some local plant lists.

S. B. P.

RECENT LITERATURE.

Monographie du Genre Onothera, Par M. le Professeur Abhe H. Léveille, Le Mans, France, Fascicle II., 1905.

It will be noticed that M. Léveille prefers the spelling Onothera, to that which we are accustomed to, the reasons having been discussed in the former fascicle. His views as to the plants to be included in this genus are diametrically opposed to those first set forth in 1835, by Spach, and recently revived by Raiman in elaborating the Onograceæ for the Naturlichen Pflanzen-familien. For while these authors divide the Sennean genus into no less than a dozen, M. Léveille not only keeps it whole, but adds to it **Gayophytum,** Clarkia, Boisduvatra and Eulobus. It were hasty to reject offhand the result of a special study, and not yet fully presented, but we very much doubt its acceptance by American botanists. We have not the space to enumerate the many changes made by the author in the rank and names of these plants so largely representd in our state. M. Léveille's practice in the citation of authors for the new combinations made, is justly open to criticism. Invariably they are credited to authors who never made them. Thus we have an **Onothera Gayophytum lasiosperma,** Greene. Now while Greene is responsible for a **Gayophytum lasiospermum,** he would undoubtedly repudiate the former combination. As appears to be inevitable, in European works theating of American plants, the names of places sometimes suffer such a "sea change" as to be nearly unrecognizable. Probably the same thing will occur when American botanists turn their attention to straightening out European genera. As in the previous fascicle the illustrations are in part from photographs of herbarting specimens, and in part from drawings, the latter usually the more satisfactory. There are also figures of the seeds of the several species, and many anatomical drawings. A third fascicle will complete the work. S. B. P.

RECENT PUBLICATIONS.

The genus Ribes in California, Muhlenbergia. Vol. 1, No. 5.

Mr. H. H. Heller, the author of the above paper, has made a special study of the American species, and here presents the first systematic results of his work, to be followed, we understand, in due time, by a complete survey of the genus as it is represented on this continent. It is a very useful paper, inasmuch as it brings together the original descriptions of the 43 species which the author recognizes as occurring within the state limits. He is to be commended for providing a key, evidently very carefully worked out. The usefulness of papers similar to the present one, is often greatly diminished by a neglect to provide them with any apapratus whereby a specimen may be traced to its appropriate species. A key, moreover, at least to some extent, is a test of the validity of species, which, if well founded, should possess characters definite enough to permit of a lucid arrangement. Judged by this test one is disposed to suspect that on a careful revision, Mr. Heller will decrease, rather than augment, the number of his species.

S. B. P.

BOTANICAL SECTION.

This Section met at the Wilcox Building March 12. Dr. Davidson read a paper on the Revision of the Western Mentzelias and showed new specimens. A communication from Geo. B. Grant on a proposed new genus of the Borage family was read.

THEODORE PAYNE, Secretary.

PUBLICATIONS REVIEWED.

Monographie du genre Onothera, par M. H. Leveille. Fasc. 2, LeMans, France, 1905.

M. Leville's monograph, the second fascicle of which has just appeared, relates to a genus so abundantly represented in our region, and proposes such a radical change in the extension of its limits, and the disposition of its species, that it possesses an especial interest for California botanists. We trust, therefore, that it will not be without interest to note briefly the changes proposed in the present fascicle. Like the first, it is freely illustrated with photographs of herbarium specimens and anatomical figures, and, in addition is enriched by very satisfactory drawings of several species.

It will be noticed that the author prefers for reasons discussed in the first part the name Onothera to the more usual orthography. His views as to what are the limits of this genus are the very opposite of those proposed in 1835 by Spach, and more recently adopted and elaborated by Raiman in the Naturlichen Pflanzenfamilien. For while these authors break up the Linnean genus into no less than twelve genera, M. Leveille not only maintains it in its entirety, but reduces to it Boisduvalia, Clarkia, Eulobus and Gayophytum.

All the North American species of the last named genus, and several from Chili, are included in a single species, O. Gayophytum, Levl., whose geographical range extends from the State of Washington to the extremity of South America. The North American species form the ''race'' Trelesiana, under which are the ''forms'' lasiosperma, eriosperma, ramosissima and diffusa. Eulobus californicus, Wats., becomes O. eulobus, Levl. Under O. brevipes, Gray, are placed Oe. scapoidea, Nutt. as a variety, and Oe. Parryi, Wats. as a ''race'' and of it Oe. heterochroma, Wats., is regarded as a synonym. O. tortulosa, Levl., includes Oe. dentata D. C. and Oe. strigulosa, D. C. The common large flowered plant long known under Watson's herbarium name of Oe. dentata grandiflora. and recently published in Abram's Flora of Los Angeles as Sphærostigma campestris Parishii, is here called O. tortulosa race helianthemiflora, Levl., and under this Oe. dentata cruciata, Wats. appears as a form. Oe. micrantha, Hornem, is referred to O. hirta, Link, under which the variety Jonesii includes plants from Avalon and Paso Robles. Oe. bistorta, Nutt., and Oe. Veitchiana, Hook., are embraced in O. cheiranthifolia, Hornem., the former as variety contorta, Dougl., and the latter as a form. The Oe. cheiranthifolia, and its var. suffrutescens, of the Botany of California, are referred to O. spiralis, Hook. Finally O. gauræflora, T. & G., includes Oe. Boothii, Dougl., as a ''race'' and Oe. allysoides, H. & A., as a synonym.

To pass off-hand judgment on the conclusions reached by a student who has devoted much time and reflection to a subject is unjust; but we venture to doubt if most of our author's dispositions will find acceptance among American botanists. Less hesitation may be felt in criticising his citation of authorities for races, varieties and forms. When not credited to himself, they are assigned to authors who are in no way responsible for them. Thus we have O. Gayophytum form lasiospermum, Greene. Now Greene is the author of a Gayophytum lasiospermum, but unquestionably would repudiate the other combination to which his name is attached. The erroneous character of these citations would have appeared at once, had the place of publication been added to the author's name, as it should be in works of importance. S. B. P.

The Water and Milk Supply of Los Angeles

E. L. LEONARD, B. S., M. D., CITY BACTERIOLOGIST.

The location of nearly every town of importance in Southern California was originally planned by the old mission fathers in relation to the possibility of its water supply. The most important missions were built in those districts where water was found in largest amount. At these old missions one may see, even today, evidences of a high degree of engineering skill possessed by these people in planning the ditches and reservoirs.

A reference to the map shows that the San Gabriel and Los Angeles rivers carry the water from the mountains toward the sea, and although not rising directly in the high ranges of the Sierra Madre mountains, at least a large part of the rain and snow finds its way into these two streams, through the underground washes with which the San Fernando and San Gabriel valleys are filled. The San Gabriel river is different from the Los Angeles river in that it has a perennial flow from the mountains in which it originates and is less affected by seasons of drouth.

The peculiar geological structure of the washes referred to shows they are made up of sand and gravel with the bed rock between 200 and 300 feet below the sea level. These immense subterranean filter galleries as we may speak of them, make the character of our water supply one of the most ideal as far as bacterial invasion is concerned. If it were possible to bring this water filtered through its beds of sand, gravel and alluvial debris directly into our city mains then our water supply would be most ideal in quality.

A study of the differences in the total rainfall in Southern California shows great variation, 5.28 inches one year and 38.23 the next. This necessarily affects the amount of water coming through the Los Angeles river, and causes great apprehension on the part of those whose business is in any way connected with the water supply.

It is almost incredible that torrents of water coming down ravines and canons are absorbed so quickly and disappear entirely into the gravel bed of the valley, while the river a few miles below shows no increase in volume whatever.

Under average conditions the river begins to appear about 11 miles from West Glendale. Its increase in volume is very marked and its flow is about 25 cu. ft. per second at the southern bend. At this point the first supply ditch is taken out, the water from which is used for irrigating purposes and to supply the parks of the city.

Filter galleries are now in process of construction at the head works where the surface water is tunneled into the bed of the river and filtered through sand before entering the head works. The bacterial count of the water before entering the filtration galleries shows 130 colonies per cu. cm. even in their incompleted condition.

The total consumption of water in Los Angeles is as great as that of San Francisco—34,000,000 gallons a day in summer, 18,000,000 gallons a day in winter.

The river still increases in volume up to about a mile above Tropico. At this point the main head works of the system are built, the flow is between 65 and 75 cu. ft. There is a slight increase in volume until Columbia Street is reached, where the river disappears altogether as the depth to bed rock increases.

During the five years which the city owned its water supply, the development of water has been given close attention by Superintendent Mulholland. With the idea of increasing the total supply different sets of wells have been bored and tunnels built.

The Buena Vista Street wells located in Elysian Park and pumping to supply the gravity reservoirs on Beaudry Avenue and Elysian Park, come from a 4000 foot tunnel under the river bed and supply about 3,000,000 gallons daily. The bacterial count varies from about 41 to about 150 bacteria to the cu. cm., depending on the season of the year. In summer time the count runs higher as the water is low. Two other wells located at the end of the West Jefferson Street car line supply 1,000,000 gallons per day and the bacterial count is between 80 and 100 colonies.

The largest part of the city water, however, is derived from the Los Angeles river. A trip to the head works occupies the greater part of a day and at this point the bacteriological tests average from 600 to 2380 colonies per cu. cm. Above the head works to the northeast the water is on the surface. It is in this region that the San Fernando farmers drain the river for agricultural purposes and in years past their stock was pastured on the banks of the stream. Dr. Powers has watched this portion of the river most closely and in years past has pulled carcasses of sheep, horses and mules out of the river. At the present time these conditions are greatly improved.

From the head works 12 miles nouthwest the city water runs in a cement conduit into the city mains. Between the head works and the Crystal Springs house, located on the other side of Griffith Park, the river again flows on the surface for a distance of several miles and enters the city mains at Crystal

Springs house. The bacterial count at this point is between 600 and 100 colonies to the cu. cm.

Various tests of the city water made from the faucets in different parts of the city shows an average of about 30 colonies to 1 c. c. The difference in the count is caused by the lack of nutrition and oxygen, and the pressure to which the water is subjected in the pipes.

It is commonly taught that any water supply containing over 500 colonies to 1 c. c. is unfit for use. You can see, however, that Los Angeles faucet water is comparatively free from bacteria. A bacterial examination of distilled water as delivered shows 190 colonies to 1 c. c., but of course weighing a matter of this kind, one must remember the kind of bacteria present is the all important consideration. It is a possibility of course that the organisms in city water are more apt to be pathogenic on account of the pollution of the San Fernando valley farmers and their stock, but in discussing the question of the transmission of typhoid fever through our water supply with Dr. Powers recently, he said in the history of the Health department he has never had reason to believe any epidemic of typhoid fever had its origin in the water supplied to the city, but rather from overflowing cesspools, cases of the disease at dairies, and the difficulty of proper sewage disposal at the beaches. About three-fourths of the cases of typhoid fever reported in Los Angeles have their origin in the country.

In making bacterial tests of water, certain general principles should be borne in mind. In the first place, the plating of the water should be done at the well, reservoir or stream to be tested. If samples are to be transported to the laboratory they should be placed on ice. Several plates should be made from portions of 1 c.c. 1-10, 4-10 and 6-10 gives one a good control test. In routine work agar is preferred to gelatine culture media, so that the growth may take place at a temperature above that of the room, 30 to $37\frac{1}{2}^{\circ}$ C. The isolation of specific organisms from a given sample of water presents many difficulties. B. Typhosus has been isolated from water about once in 500,000 times according to Williams. B. Coli is more readily found on account of its greater endurance, and although this organism has been found in the faeces of birds and other animals besides man its presence in large numbers in a given sample of water is considered suspicious by many city bacteriologists.

The Owens river project opens up a bright future for Southern California. You are all more or less familiar with the plan to bring the waters of this fertile valley 200 miles northeast in Inyo County to Los Angeles. A clear and interesting account of the plan is given in the November number of Outwest, to which I refer you.

The matter has been voted upon, bonds are sold and work will begin early in February on the construction of conduits and tunnels. It is estimated that the work will require at least four years to be completed. Others estimate at least ten years will be required.

Milk Supply.

In 1894 the work of testing the milk for butter fats was begun by Dr. Powers in Los Angeles in the little room 6x10 in the attic of the City Hall which served as a chemical, bacteriological and milk laboratory as well as fumigator's room and detention ward for contagious cases for several years.

During 1894 to 1897 nothing systematic was accomplished on account of the lack of assistants. In 1897 the City Council allowed a milk inspector who went to the larger dairies supplying milk to the city, and made systematic tests of milk for butter fats and solids. The dairymen made strenuous objection to any ''interference'' with their work, and said the cattle in this country couldn't produce as rich milk as elsewhere on account of the climate and feed of Southern California.

In the early part of 1898 a standard was established for 3% fats and 12 1-2% solids. Then the long hard work began of compelling dairymen supplying milk to the city to conform to this standard. The early part of the work was done by Mr. George Hooser, whose untiring energy did much to bring about a better condition of affairs. To put one's self in the dairyman's place doesn't require very much imagination; to be held up at some dark corner between two and three o'clock in the morning, have an inspector open the cans, test each one with the lactometer, and at last to find those which had evidently been replenished from the water faucet, and take a sample and within the next day or two bring the driver before a police court judge was a common occurrence in those days. Such was the character of the work and it almost goes without saying that this particular busy milk inspector lost his job at the next election!

The work of educating these dairy owners has always been one of Dr. Powers' numerous special duties, and to his untiring zeal we owe the present fairly good condition of the milk supplied to Los Angeles. In 1905 the standard for fats was raised to 3 1-2%, solids 12 1-2%, while in reality the majority of the milk tests show 4% fats with the Babcock test.

The confidence of most of the dairymen has been won and they realize that the ordinances in regard to standards, cleanliness, etc., are for their own interests. It is gratifying to see them come to the office for advice and counsel.

With the close of this year the first systematic bacteriological work has been done on the milk supplied, 39 dairies have been visited by the City Bacteriologist, and three sets of tests made from each dairy.

At the various city depots 12 different visits have been made and 49 different dairies tested as the milk was brought in to the depot. Tests have been made also of the milk as delivered to the consumer—46 specimens from restaurants and hotels were examined.

In July of this year the Board of Health established a bacterial standard for milk of 500,000 colonies to 1 c. c., after a careful study of the tests made. This has been conformed to by the better conducted dairies and the work has proved a stimulus to the majority of the dairymen. The long years of education by Dr. Powers, and the activity of the present Board of Health in visiting the dairy ranches have resulted in the use of more whitewash on the dirty corrals, more screens and cleaner milk houses and in some cases even in the washing of the milker's hands and cleaning of the udders of the cows than in several years.

There is perhaps no medium outside of blood serum which forms such an ideal culture material for bacteria as milk. It is estimated that milk 24 hours old contains more bacteria than sewage.

These are derived from the body of the cow, the hands of the milker, his pails and utensils, the water with which the cans are rinsed, the air and the flies. The temperature of milk results in a rapid increase of the number of germs and even under ordinarily clean surroundings the number of organisms in a given sample is necessarily large.

The udder of a cow is practically free from bacteria, but the lactiferous ducts are more or less crowded with various forms.

Prof. Russell, of the University of Wisconsin, gives the following interesting figures. Foremilk, 26,000 to 48,000; Milk after removal of foremilk, 1,000 to 4,000 colonies in 1c. c. In many of the large cities this fact is taken advantage of and certain dairies are under the immediate supervision of physicians and health boards. The cows are cleaned, milk utensils are scalded and milkers wear clean white clothing, the foremilk is discarded and the high grade product is known as "certified milk." So far Los Angeles has no concern which furnishes this class of milk, but it is believed by those who have studied the question that there is a fortune in the dairy business along this line.

Much of the milk delivered to the city through the depots is pasteurized, that is, exposed to a temperature between 65 and 70° C., by which a great number of bacteria are destroyed. Milk brought in by dairymen showing 16,000,000 bacteria to 1c. c. after pasteurization shows a count of 100,000 per cu. cm. While pasteurization might partially settle the question of clean milk it would put the small dairymen out of business and restrictions about cleanliness would be in a great measure removed. Lactic acid and other bacteria are destroyed which are necessary for the flavor in butter and cheese. During the past year the bacterial count at the dairies has conformed to the standard of 500,000 colonies per cu. cm., most of the best dairies showing from 50,000 to 300,000. The particular disadvantages for clean milk in Southern California are the dust, the warm days and transportation from the dairy to the consumer. Dairies on the electric lines have a decided advantage over thost whose milk is brought to the city in wagons. The average number of bacteria in milk delivered to the consumer in Los Angeles is between 1,000,000 and 3,000,000 to one c. c. While this may seem an enormous number of germs (48,000,000 in an ordinary glass of milk) very few of this number are pathogenic. A comparative study of the bacteriological standards of other cities is of interest:

Munich, 200,000 to 6,000,000.

Wurzburg, 222,000 to 23,000,000.

Boston, 30,000 to 4,220,000.

Middletown, Conn., 11,000 to 85,500,000.

Sewage, 100,000 to 4,000,000.

The different species of bacteria found in milk are about 200. Many of these are necesary for the production of flavors in butter, cheese and in the milk itself. Among the more important contagious diseases probably transmitted by milk, are tuberculosis, diphtheria and typhoid fever.

The most important work along dairy lines of the Los Angeles Health Department for the year is the appointment of a veterinarian, Dr. L. W. Young, whose three months of work have been productive of great good. Many diseased animals have been removed frof dairy herds, suffering principally from tuberculosis and actinomycosis, and after all our main hope for the future must be in removing of diseased animals from dairy herds.

A Revision of the Western Mentzelias

BY ANSTRUTHER DAVIDSON, M. D.

The difficulties attending the determination of the Mentzelias of the Genus Trachyphytum I thought might be wholly personal, but on looking over the herbaria of the University of California, Messrs. Parish and Brandegee, I have sufficient reason for thinking that other botanists have found their investigation as unsatisfactory as I have.

When at the British Museum and at Kew Gardens last summer, I was generously aided in the examination of the specimens they possess. These had been examined by Urban and Gilg, when preparing their exhaustive monograph "Monographia Loasacarum." Many of the specimens were named according to their classification, and the collector's herbarium number of many of the specimens quoted is given in the monograph. The work of identification was thus rendered very easy.

In the "Monographia Loasacarum" the authors have left **M. micrantha, M. congesta** and **M. aurea** as we understand them, but all the others are grouped as varieties of **M. albicaulis** Dougl.

Five varieties are given:

Var. a—**Genuina** Urban et Gilg. is our **M. integrifolia** Wats.

Var. b—**Veitchiana** Urb. et Gilg. is **M veitchiana** Kell and **M. affinis** Greene.

Var. c—**Gracilenta** Wats. is **M. gracilenta** T. & G.

Var. d—**Jonesii** Urb. et Gilg. New species from Yucca, Ariz.

Var. e—**Pectinata** Urb. et Gilg. is **M. pectinata** Kell.

To me this is no solution of our difficulties and while it may, like some of the new religions, be very broad and accomodating, it is not exactly what is desired for scientific work. In some instances there is lack of consistency in their labelling. **Acrolasia pinetorum,** Heller, is in one place classed as **genuina,** and in another as **veitchiana. A. pinetorum,** Heller is a very definite species and bears no very close affinity to any other.

Elmer 3657, Acton, Los Angeles, labelled **M. congesta,** is obviously **Acrolasia davidsoni,** Abrams. The latter species is so distinct from the typical **congesta,** and its geographical range is so different that one cannot very well understand its being overlooked.

These differences of opinion may be but another proof of of the difficulties atendant on any attempt to rigidly classify this genus. Whether my attempt to make more easy the segregation of the species is successful, time alone will tell. It has at least resulted in a better understanding of the distribution of the recognized species.

In the herbaria examined there was but one specimen of **Acrolasia pectinata** and none of **A. nitens,** Greene. I have in consequence omitted all reference to those two though I think that they may be valid species. I have supposed **A. dispersa,** Wats. and **A. integrifolia,** Wats., to be the same species.

The species of the genus Trachyphytum may be classified according to their vegetative characters in the following order: A. aurea; gracilenta; affinis; viridescens; albicaulis; congesta; davidsoni; desertorum; dispersa; pinetorum; montana; but for study purposes the most accurate method is that adopted by Dr. Greene in the "Flora Franciscana." The shape of the seeds is here the key to the grouping. The specimens examined would seem to indicate that the shape of the seeds in the different species is fairly constant, and this with the other specific characters help to definitely determine the rank of each.

In one important particular I must differ from all authors. **A. gracilenta** is invariably described as having seeds in three rows. In this district the plant is fairly common. I have examined large numbers of them in the fresh state and have invariably found only one row to exist. So far as I can determine the herbaria specimens from elsewhere show but one row of seeds.

There are but few exceptions to "seeds in a single row" in this genus; these will be specified later.

The seeds of **A.gracilenta** may be taken as a type of which all the species showing the prismatic form of seed are more or less a variation. Those of **gracilenta** viewed from above are triangular prisms as broad as deep, grooved on the angles, the upper surface depressed below the edges. Perfectly symmetrical seeds of this shape are only to be found towards the centre of the capsule, those near the ends being all more or less distorted. In **integrifolia** the seeds are deeper and more oblique at the ends. In some of the others the grooves widen out so as to form irregularly sided seeds, but the general tendency is to conform to this prismatic type even in those species of the albicaulis group where the seeds are irregular and very seldom show any grooves on the angles. The width of the groove varies in different species but this is too slight a feature to be a means of identification. Reference to the tubercles on the seeds I have omitted as all show it more or less under the microscope, so that it is difficult to say when they may be considered smooth. **Pinetorum** comes nearest to being smooth.

KEY

Seeds prismatical with grooved angles.
  Petals 2 lines long or less.
    Floral leaves concealing flowers............**A. micrantha**

Floral leaves not concealing flowers.
Calyx lobes ½ line long.................**A. pinetorum**
Calyx lobes more than ½ line long.
Leaves mostly entire.................**A. integrifolia**
Leaves somewhat cinereous...........**A. desertorum**
Leaves light green, hairs on capsule pustulate at base **A. viridescens**
Petals 4 lines long or more.
Petals about 4 lines, capsular hairs with pustulate base **A. affinis**
Petals about 6 lines long, capsular hairs not pustulate at base **A. gracilenta**
Seeds irregularly angled, only occasionally grooved.
Petals 1 inch long or more.......................**A. aurea**
Petals small.
Floral leaves almost concealing the capsule.
Leaves pinnate partite or much divided...**A. congesta**
Leaves mostly entire, bracts larger...**A. davidsoniana**
Floral leaves not concealing capsule.
Capsule over 6 lines long, floral leaves much shorter **A. albicaulis**
Capsule 6 lines long or less, one of the floral leaves as long as the capsule..............**A. montana**

Acrolasia micrantha, (T. & G.) Rybd.

Rather rare. The specimens from Catalina and Guadalupe are more decumbent and foliaceous than those of the interior. It may be found in nearly all the canyons of the Santa Monica mountains, and is probably more common there than anywhere else in the county. The plants from the interior are more strict and stouter of habit; notably those from Canyon Diablo, Davy 245, Saratoga, Santa Clara Co.: Davidson, Catalina Is. and Santa Monica Mts.: Hall 1219, Temecula Canyon, Riverside Co.: Brandegee July 1888,Little Sur, San Diego Co.: Orcutt, June 4, '83, Tia Juana.: Anthony 259, Guadalupe: Parish June 1893, Canyon Diablo.

A. micrantha stricta. .n. var.

Annual, 8 in. high, upright and stiff in habit, cauline leaves 1½ in. long, 3 lines broad, diminishing upwards, regularly sinuate toothed or serrate; floral bracts broadly ovate, entire or remotely tothed as in type; flowers, capsule and seed as in type. The strict habit of growth and the symmetrically toothed leaves separate it from the type. F. W. Hubby No. 67, Ap. 6, 1896, Ojai, Santa Barbara Co.; E. L. Greene, June 24, 1892, Mt. Diablo, Cal. The former in the University of California **the type.**

A. pinetorum, Heller.

A well defined species widely distributed in California, ranging from Plumas County to San Diego and apparently limited to the mountains of over 5000 ft. alt. Seeds in one row; the perfect ones grooved on all the angles; in shape they are miniatures of **gracilenta.** Though somewhat resembling **dispersa,** the very short calyx lobes and long attenuate capsule readily distinguish it from any other species. It has been hitherto confused with **dispersa** and all the herbaria specimens examined have borne the latter name. I listed it as "dispersa" in my county list. Abrams in Flora Los Angeles Co., names it "affinis."

C. A. Purpus, Potter Valley, Mendocino Co.: Heller 7503, Alma Soda Springs, Santa Clara Co.: Congdon 185, Mariposa: Hall & Babcock 4418, Warner Creek, Plumas Co., 4800 ft. alt.: Hall & Chandler 269, Pine Edge, Fresno Co., 3500 ft. alt.: Davidson, Wilson Peak, Los Angeles Co., 6000 ft. alt. Hall 2272, Strawberry Valley, Riverside Co., 5200 ft. alt.: Hall 1228, Lytle Creek, San Bernardino Co., 5700 ft. alt.: Brandegee June 20, 1904, Laguna Mts., San Diego: Purpus 5102, Pah Ute, 7 to 8000 ft. alt.

A. integrifolia, (Wats.) Rydb.

In the collections examined this species is not represented from California. Heller 3147, Lewiston, Idaho: Brandegee July, 1897, Teton Forrest, Wyoming: Baker 1345, Douglas Co., Nevada: Crandall, Lorimer Co., Col: Baker 203, Black Canyon, Col.: Heller 6865, Donner Lake: Brandegee 791, Washington.

A. desertorum, n sp.

Annual, 4 to 6 in. high, branching from base; basal leaves narrowly lanceolate 1½ to 2 in. long, 1 to 2 lines wide, tapering to a long petiole like base, pinnatifid or deeply toothed, stem leaves broader, sessile, ovate lanceolate, floral bracts ovate-lanceolate, 1 to 2 lines broad, the longest half the length of the capsule; calyx lobes 1 line long, flowers slightly longer; capsule 6 to 9 lines long, narrow linear-clavate; seeds in one row, grooved on angles. The whole plant greyish with close-set, short stiff hairs.

The Arizona species distributed as **albicaulis** probably includes this species, which differs materially from **albicaulis** in floral characters and seeds. It however does not agree with the specimens I gathered at Lordsburg, N. M., but the material I possess is too scanty to pass judgment upon. Brandegee, March 30, 1901, Signal Mt., Colordao Desert near boundary line: Hall No. 2788, April, 1902, Coyote Canyon, 500 ft. alt., western border of the Colorado Desert, Cal. The former is the type.

A. viridescens, Heller.

Mr. Heller kindly sent me a specimen of this. While the light green color of the plant, and the small flower seem distinctive enough, yet the hairs on the capsule show slightly pustulate at base, and the shape of the leaves are rather suggestive of **affinis**.. Halls No. 6073, from Sheep Hole Mts., Mohave Desert, San Bernardino Co., is probably this same species, though the capsule is more hirsute, and the flowers larger. It may prove to be but a variety of **affinis.**

A. affinis, (Greene) Rydb.

A species of the interior plains extending to Tucson, Ariz. The specimens distributed by Mr. Toumey as **albicaulis** are evidently not that species and may be tentatively placed here. Brandegee July, 1887, Sissons: Davy 1742, Bakersfield: Baker 2781, Tracy, San Joaquin Co.: Mitchener & Bioletti, April 10, 1892, Byron, Contra Costa Co.: Parish 4165, San Bernardino Co., and 1873, Arrowhead, San Bernardino Co.: Hall 3829, Riverside, and 3236, Simi, Ventura Co.: Toumey 163, Tucson, and April 8, 1894, Tucson.

A. gracilenta, (T. & G.) Rydb.

This species is not uncommon around Los Angeles and is properly a coast plant.

Brewer, May 7, 1861, San Antonio Creek, Monterey Co.; Barber, Paso Robles, San Luis Obispo Co.; Summers 350, Santa Lucia Mts.; Hall 1378, Swartout Canyon and 6217, Cajon Pass, San Bernardino Co.; Hall 6002, Cotton Wood Pass, and San Jacinto Lake, Riverside Co.: McClatchie 71, Elsinore: Orcutt, June 27, 1884, Point Loma.

A. pectinata, (Kell) Rydb.

Davy 2176, Tehachapi, Los Angeles Co.

A. congesta, (Nutt.) Rydb.

Parish 1976, Mohave Desert; is the only specimen seen from west of the Rockies.

A. davidsoniana, Abrams.

Probably limited to the high mountains west of the Rockies Its altitudinal range and general distribution in California is apparently the same as **pinetorum.** On Wilson Peak, Los Angeles Co., both are found close together among the pines. The seeds are in three rows in the capsule.

Schockley 304, Miller Mt., Nevada, 7000 ft. alt.; Congdon, Aug. 19, 1894, Ease of Minarets, Mariposa Co.; Hall and Chandler, Byron, Eldorado Co., 6300 ft. alt.; Hall and Babcock 5203, Bonita Meadow, Tulare Co., 8500 ft. alt.; Hall 2225, San Jacinto Mt., 5200 ft. alt.;

Parish, June, 1895, Cushenberry Canyon, Riverside Co.: Brandegee, June 23, '93, Honey Lake, Cal.: Purpus 5286, Pah Ute, Cal.

A. albicaulis, (Dougl.) Rydb.

A species of the Rocky Mountain region, occasionally represented westwards, as at Bear Valley, Fort Tejon (Greene), and Providence Mts., Lower California.

Brandegee, May, 1875, Canyon City, Col.; Cowen, May, 1892, Lorimer Co., Col.; Gooding 932, Meadow Valley, Nevada; Drew, July 20, 1889, Bloody Canyon, Mono Co.; Parish 3314, Bear Valley ,6500 ft. alt.; Brandegee, May 26, 1902, Providence Mts.; Orcutt, July 5, 1884, Cantillas Mts., Lower California.

A. montana, n. sp.

Annual; 12 to 15 in. high, upright, slender stems, very white and quite smooth to the eye, sparse hairs show under microscope: basal leaves 2 to 3 in. long, 4 to 6 lines wide, pinnatifid or roughly toothed or coarsely serrate; cauline leaves, 1 to 1½ in. long, 2 lines wide in the middle, broader below and toothed on each side, narrowed at base sessile; petals 2 to 3 lines long, yellow, calyx lobes 1½ lines long; floral bracts 3, all lanceolate-ovate, entire, occasionally toothed near base and broader, the longest 1 line wide, equalling the capsule, the other two successively shorter; capsule clavate ½ in. long or less, 1 to 1½ lines broad; leaves and capsule pubescent with soft, rather long hairs; seeds in three rows, brown, irregular, only an occasional one grooved.

In vegetative appearance it most closely resembles **pinetorum,** but the short capsule, and long floral bract readily differentiate it from any other species. The type is No. 6511. H. M. Hall, Mt. Pinos, Ventura Co., 6000 ft. alt., in author's herbarium.

Memorial of Stephen Grout.

Mr. Stephen Grout died at Riverside, Cal., on the fourth day of February, 1906. He had attained to a ripe age, having been born October 28, 1823. His birthplace was Stratton, Vermont, and it was in that state that the most of his life was past. He was educated at the Academy at Manchester, and in 1857 became a resident of East Dorset. Here he married Miss Henrietta A. Fuller, and here he continued to reside until the close of the year 1899, taking a large share in all the activities of the place, both civic and religious. In that year, his health failing, he sought the milder climate of California, and after a year's residence in Los Angeles, he removed, in January, 1901, to Riverside.

East Dorset, where so great a part of Mr. Grout's life was spent, is situated in one of the southern valleys of the Green Mountains, a region rich in a varied flora. From a boy he had felt an interest in plants, and a desire to learn something about them, and at East Dorset he began the study of botany, a study in which he enjoyed the companionship of his wife. Later, in 1894, he began his collection of the plants of that region, which he afterwards continued to enlarge, as opportunity served. He was one of the founders of the Vermont Botanical Club, of which he continued an active member so long as he resided in that state. While in Los Angeles he became a member of the Southern California Academy of Sciences, and on his removal to Riverside was one of the little company of botanists who organized the Botanical Club of that place. In this society he took great interest, and was its president until his death.

With advancing years his love of plants rather increased than diminished, and although after his removal to California his activity was much restricted, he found an unfailing interest in the novel flora about him, and lost no opportunity of adding to his knowledge of it. The feebleness of his years was of the body only, and had not sapped the vigor of his mind. He was fortunate in retaining to the last a fresh interest, not only in his studies, but in all the great movements and events of our times. His disposition was modest and retiring, and a transparent simplicity, and sincerity were marked traits of his character. His gentle and unaffected kindliness are a pleasant memory to all who knew him. S. B. P.

Botanical Nomenclature at the Vienna Congress.

No subject received more careful consideration at the International Botanical Congress, which met in June last in Vienna, than that of botanical nomenclature. The conclusions reached by a representative body of this high character are of importance to botanists everywhere, and especially to us here in America, where nomenclature has tended, of late years, to fall into lamentable confusion.

Two rules were adopted without dissent. The first establishes 1753, the year in which Linnaeas published his "Species Plantarum," as the initial date for both genera and species. The second provides for uniformity in the terminations of the names of orders, families, etc. Thus, Carduaceae should take the place of Compositae, and Brassicaceae of Cruciferae.

The remaining laws, while failing to command unanimity, were adopted by large majorities. They provide that the adjective name shall be preserved when a species is transferred from one genus to another, but a varietal adjective is not necessarily to be retained when a plant is raised in rank. Duplicate names, such as "Sassafras, sassafras," are not to be permitted, and the famous dictum, "once a synonym always a synonym," is rejected.

It will be seen that the Congress decisively rejected the peculiar rules accepted and so zealously applied by a very respectable body of American botanists. It seems to have been of the opinion that stability was not obtainable by sacrificing practical convenience to a pedantic construction of the rule of priority. Surely if it is to be achieved at all, it must be by conformity to the decisions of the international authority. The choice lies between conformity and provincialism. S. B. P.

A Preliminary Synopsis of the Southern California Cyperaceæ. XI.

BY S. B. PARISH

(Continued from page 133, Vol. 4)

Subgenus II **Vignea,** Koch, Syl. Fl. Germ. 784.

Spikes sessile, more or less aggregated in heads, panicled, or rarely solitary. Staminate flowers few, borne at the summit or at the base of the spikes, or rarely intermingled with the pistillate flowers, or spikes unisexual, or the plants dioecious. Perigynia plano-convex in cross section. Stigmas always 2. Achenes plano-convex or lenticular.*

*I take this opportunity to acknowledge the kind assistance of Dr. Theodore Holm, in the determination of some difficult specimens of this subgenus, and also my indebtedness to Mrs. Charlotte M. Wilder for the drawings from which Plates 20 and 23 were reproduced.

KEY TO VIGNEA.

A. Staminate flowers at the summit of the spikes.

Heads elongated, interrupted below, paniculately decompound.

Perigynia firm, margined to the base......20. **C. chrysoleuca**

Perigynia spongiose at base, margined above.

Perigynia nerveless ....21. **C. alma**

Perigynia nerved on the outer face...........22. **C. vitrea**

Heads ovoid to ovoid-oblong.

Spikes greenish, the lower compound; rhizomes brown.

23. **C. Douglasii**

Spikes brown, simple; rhizomes black........24. **C. marcida**
Heads ovoid or globulose; spikes simple.
Perigynia suborbicular, marginless......25. **C. Bernardina**
Perigynia ovoid-acuminate, margined..........26. **C. densa**
Perigynia narrowly-lanceolate, margined.....27. **C. nervina**
Heads narrow of a few separated spikes.....28. **C. Hookeriana**

B. Staminate or pistillate flowers in separate spikes, or intermingled, or plants dioecious.

Perigynia marginless.
Spikes distant.
Spikes subglobose, few-flowered.29. **C. stellulata ormantha**
Spikes oblong, many-flowered...........30. **C. Bolanderi**
Spikes contiguous, linear-oblong..........31. **C. prægracilis**
Perigynia margined.
Rhizomes black .... 24. **C. marcida**
Rhizomes brown.
Heads broadly ovoid, compact..........23. **C. Douglasii**
Heads oblong, loose.......................32. **C. siccata**

C. Staminate flowers at the base of the spikes.

Spikes distant.
Spikes subglobose, few-flowered ..29. **C. stellulata ormantha**
Spikes oblong, many-flowered.............30. **C. Bolanderi**
Spikes contiguous, linear-oblong............31. **C. prægracilis**
Spikes loosely or compactly aggregated.
Spikes green or greenish.
Spikes silvery-green, 5-10 mm. long...........33. **C. feta**
Spikes brownish-green, 7-15 mm. long.....34. **C. specifica**
Spikes brown or tawny.
Perigynia marginless, smooth................35. **C. illota**
Perigynia wing-margined, serrulate.
Perigynia brown, strongly convex........32. **C. siccata**
Perigynia thin and scale-like.
Bracts inconspicuous, shorter than the heads.
Spikes distinct in a cluster.
Spikes oblong, 4-6 mm. long.......36. **C. Preslii**
Spikes globulose, 3-5 mm. long....37. **C. subfusca**
Spikes in a compact head.....38. **C. festiva stricta**
Bracts conspicuous, exceeding the heads
39. **C. athrostachya**

Section 1. ACROARRHENÆ, Fries, Summa, 73. Staminate flowers borne at the summit of the spikes, or in a few species some spikes wholly pistillate, or the plants diœcious.

**Spikes stramineous or light brown, numerously aggregated in decompound clusters, which are paniculately disposed in an elongated head, usually interrupted below; staminate flowers in an evident, persistent* *terminal cone; scales chaffy, and at maturity loose and spreading; bracts short and inconspicuous, awnlike from an expanded chaffy base; culms leafy; rhizomes light in color.*

+*Staminate column conspicuous; heads brownish.*

20. **Carex chrysoleuca,** Holm, Am. Jour. Sci. 17:302, f. 3. 4.

Culms slender, but stiff and erect, 3-angled, roughish above, 4-5 dm. tall; leaves carinate, 3-4 mm. wide, shorter than the culms; heads 3-6 cm. long, 5-10 mm. thick; spikes ovoid; scales exceeding the perigynia, the linear midvein excurrent as a short, rough awn; perigynia light brown, firm, distinctly nerved on the outer face, broadly ovoid, serrate above, abruptly contracted to a narrow, deeply-split beak, shortly stipitate, 3 mm. long; achenes light brown, lenticular, broadly ovoid, puncticulose, filling the body of the perigynia.

Volcan Mt., San Diego Co., June 20, 1881; D. Cleveland. Coldwater Cañon, San Antonio Mt., Los Angeles Co., July, 1902; 2679 Abrams. The type was collected in Mariposa Co., by Congdon.

++*Staminate column less evident; heads stramineous.*

21. **Carex alma,** Bailey, Mem. Torr. Club, 1:50.

Culms stoutish, rough above on the sharp angles, 4-12 dm. tall; leaves carinate, 3-5 mm. wide, mostly exceeding the culms; heads 9-12 cm. long, 10-15 mm. thick; spikes ovoid, in ovoid clusters; scales equalling the perigynia, oval to oval-oblong, acute, or with the linear midvein excurrent; perigynia brown, shining, nerveless, ovoid, narrowed to a long, bidentate beak, serrate on the sharp upper margins, thick and spongiose at the mostly truncate base, 3.5-4 mm. long; achenes brown, puncticulose, lenticular, oblong 1.75-2 mm. long.

Growing in robust clumps along streams in the mountains of the Cismontane region, and ascending the Nevadan range to 7,500 ft. alt., Mt. Pinos, Ventura Co.; Middle Fork, 5,800 ft. alt., June, and Bitter Creek, 7,800 ft. alt., July, 1905; 6479, 6570 Hall. Near Santa Ana; Helen D. Geis. Pasadena; McClatchie. San Antonio Cañon, 5,500 ft. alt., Aug., 1893; Hasse. San Bernardino Mts.; Vivian Creek, 7,500 ft. alt., July, 1904; 6399 Geo. B. Grant. Bear Valley, 6,500 ft. alt., Aug., 1882, and City Creek, 3,000 ft. alt.; 1611, 2223 Parish. The type was 396 Parry & Lemmon, from San Bernardino Co. Some specimens have been referred to **C. teretiuscula,** Good., a species which probably does not occur here. When not entirely mature the perigynia are whitish, and 3-nerved on the back, but when fully mature are smooth and brown.

22. **Carex vitrea,** Holm, Am. Jour. Sci. 17:303, f. 5, 7.

Culms slender, rough on the edge, 6-7 dm. tall; leaves flat, 3-4 mm. wide, longer than the culms; spikes in oblong clusters, 1-2 cm. long, the lowest often on a short stalk; heads 8-10 cm. long, manifestly paniculate; scales shorter than the perigynia, ovate-acuminate; perigynia brown, ovoid-lanceolate, few nerved on the outer face, the narrow in-curved margins serrate above, spongiose at the rounded, stipitate base, 3 mm. long, the beak half the length of the body; achenes ovoid, lenticular, 1.5 mm. long.

Growing in robust tussocks on the margins of streams, on the desert side of the San Jacinto and San Bernardino Mts. West Cañon, Palm Springs, 500 ft. alt., April, 1882, 1896; 1572, 4144 Parish, the latter the type. Cactus Flat, head of Cushenberry Cañon, 4,500 ft. alt., May, 1882, June, 1895; 1773 B, 3724 Parish. The only carex of the desert borders.

***Spikes aggregated in ovoid or oblong heads; some spikes unisexual, or the plants diœcious; rhizomes scaly, creeping.*

+-*Heads dense, greenish brown, ovoid usually nearly as wide as long; upper spikes simple, the lower compound; stigmas long; rhizomes brown; plants mostly diœcious.*

23. **Carex Douglasii,** Boott in Hook. Fl. Bor. Am. 213, t. 214 W. Boott in Wats. Bot. Cal. 2:231. Bailey, Proc. Am. Acad. 22:138.

Culms smooth, 4-30 cm. tall; leaves 1 mm. wide, tapering to a long, slender point, exceeding the culms; bracts scarious, broad and clasping at base, the strong green midvein mostly prolonged as a smooth awn; heads 2-4 cm. long; spikes oblong, up to 1 cm. long; scales longer than the perigynia, pallid, narrowly lanceolate, acute or cuspidate; perigynia castaneous, ovoid, strongly convex, wing-margined, 4 mm. long, the serrate, bidentate beak one-third the length of the body; achenes castaneous, orbicular, 1.5-2 mm. long.

Summit of Mt. Pinos, Ventura Co., 8,800 ft. alt., July, 1905; 4554 Hall. A species of high altitudes, extending north to Oregon, and east to Wyoming and New Mexico.

+-+-*Heads brown, ovoid to narrowly oblong, usually longer than wide; rhizomes black.*

24. **Carex marcida,** Boott in Hook. Fl. Bor. Am. 212, t. 213.

Culms, slender, roughish, 1.5-3 dm. tall; leaves 2 mm. wide, shorter than the culms; heads 1-1.5 cm. long, 5-7 mm. thick; spikes ovoid, 5 mm. long, all but the upper often wholly pistillate; bracts inconspicuous, scale-like, rough awned; scales as long as the perigynia, ovate, acute or cuspidate; perigynia dark brown, ovoid, serrate above, sharp on the margins, 3 mm. long, attenuate to a beak half as long as the body; achenes pallid, ovoid, 1.5 mm. long.

Apparently confined to the marshes near the coast. Ballona, April, 1889; Hasse. Mesmer; 3239 Abrams. Santa Ana; Helen D. Geis.

According to authors this sedge is of wide distribution in western America, but probably several species may be confused under the name. I refer our own plants to it with doubt. The type was "a few specimens brought by Mr. Scouler from the Columbia river." It was described by Dr. Boott in Hooker's Flora Borealis-Americanæ, where the perigynia are characterized as "**late ovatis accuminatatis rostratis, superne margine serratis.**" Later he redescribed it in the "Illustrations of the Genus Carex," broadening the characterization of the perigynia to "**suborbiculatis vel ovatis, plus minus rostratis, superne margine alatis serratis.**"

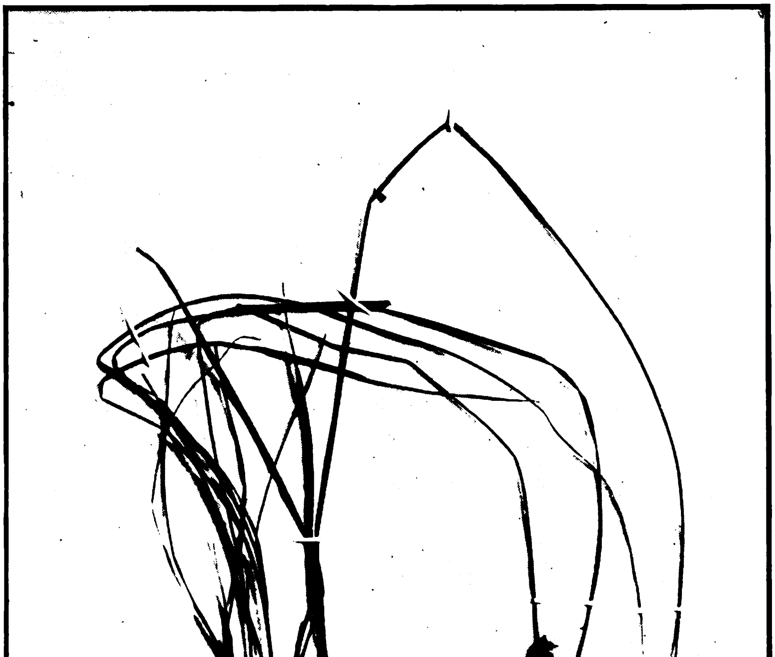
In both works the details are figured, but so unlike in the two plates, that it is difficult to believe that both were drawn from the same plant. This discrepancy is noted in the "Illustrations," but not explained. Britton and Brown, in the "Illustrated Flora," adopt Boott's later description and figures, and if these represent the true species, our plants hardly can be of it. They may be included, however, if the earlier figure be taken as the correct representation. Recent authors state that the plants are sometimes "nearly dioecious," and that some spikes are wholly staminate. These characters are not noted in either of Boott's descriptions, and do not appear in our specimens.

Plate XX, Fig. 2. Tracing from t. ccxiii, Hook. Fl. Bor. Am. 1. Pistillate flower. 2, 3. Perigynia. 4. Achene. Fig. 7. Tracing from t. xlv, Boott, Ill. Gen. Carex. a. Perigynium, anterior face. b. Perigynium, posterior face. c. Pistil. h. Pistillate scale. i. Bract. Fig. 5, Drawn from Hasse's specimen. a. Perigynium. b. Pistil. c. Pistillate scale.

*****Spikes light brown, simple, aggregated in a dense ovoid or globulose head; bracts inconspicuous, aristate from an expanded scarious base.*

25. **Carex Bernardina,** n. sp.

Rhizome creeping; culms slender and lax, rough on the sharp edges, 5-6 dm. tall; leaves 1-3 mm. wide, shorter than the culms; spikes in a dense ovoid head, about 2 cm. long and 1-1.5 cm. thick; scales a little shorter than the perigynia, hyaline, with a brown midvein, ovate, acute; perigynia brown, suborbicular, strongly nerved on the exterior face, the subcordate base stipitate, 2-2.5 mm. long, contracted to a serrate beak as long as the body; achenes pallid, lenticular, puncticulose, conformed to the body of the perigynium.



Corex Barnardina

In a meadow, San Bernardino Valley, 1,000 ft. alt., April 13, 1900; 4600 Parish.

Plate XXI. Type specimen, photographed by Mr. W. G. Wright. Plate XX. a. Perigynium, inner face. b. Exterior face of the same. c. Scale.

26. **Carex densa,** Bailey, Mem. Torr. Club, 1:50. **C. paniculata,** W. Boott in Wats. Bot. Cal, 2:232. **C. Brongniartii densa,** Bailey, Proc. Am. Acad. 22:137.

Culms slender, scabridous above, 5-8 dm. tall; leaves 3-5 mm. wide; much shorter than the culms; spikes few in a dense ovoid or globulose head, 2-5 cm. long, 1-2 cm. thick; scales about equalling the perigynia, castaneous with prominent green midvein, narrow, the accuminate apex rough; perigynia ovoid-acuminate, strongly nerved on both sides, serrate above on the sharp margins, 3 mm. long, prolonged into a narrow beak; achenes conformed to the body of the perigynium.

Cuyamaca Mts., July 12, 1875; 389 Palmer. This specimen, the type in part, was referred by W. Boott, in the Botany of California, 2:232, to **C. foetida,** the **C. vernaculata** of Bailey, Bull. Torr. Club, 20:417. The species extends throughout the Sierra Nevada to northern California, the above station being its southern limit.

27. **Carex nervina,** Bailey, Bot. Gaz. 10:203, t. 3, f. 6-8; Proc. Am. Acad. 22:184.

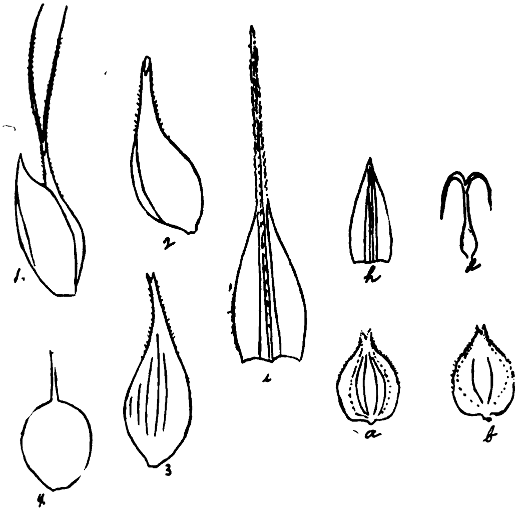
Culms slender, slightly roughened above, 4-5 dm. tall; leaves nearly smooth, 2 mm. wide, mostly very short; spikes 6-10, in an ovoid or globulose head, 1-1.5 cm. long; scales shorter than the perigynia, brownish, oval, obtuse or acutish; perigynia brownish, lanceolate, spongiose at the obtuse base, 4 mm. long, gradually narrowed to a long, rough beak; achenes olivaceous, 2 mm. long, not filling the perigynia, which thus appear thick-margined.

At high altitudes in the San Bernardino Mts. High Creek, 9,500 ft. alt., July, 1904; 6403 Geo. B. Grant. Cienega between Bear Valley and Bluff Lake, 7,000 ft. alt., Aug., 1902; 2656 Abrams. The type was collected at Summit Camp, in the central Sierra Nevada, in 1870, by Kellogg.

*****Spikes light brown, discontiguous, or at the apex clustered, in a short narrow head; rhizomes creeping, scaly and brown.*

28. **Carex Hookeriana,** Olney, Silliman's Jour. Ser. I, 29:248, f. 75. Bailey, Mem. Torr. Club, 1:14. **C. muricata gracilis,** Boott, Ill. 193. W. Boott in Wats. Bot. Cal. 2:236, Bailey, Proc. Am. Acad. 22:140. Jepson, Fl. W. Mid. Cal. 92.

Culms slender, erect, scabrid, 3-5 dm. tall; leaves flat, 2-3 mm. wide, tapering to a fine point, equalling or exceeding the culms; spikes 3-5, narrowly ovoid to ellipsoidal, 3-5 mm. long; lower



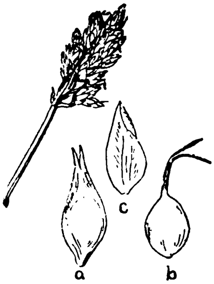


Fig. 5.

Fig. 7

Fig. 2

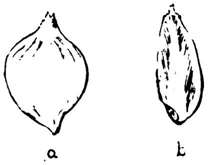


Fig 1

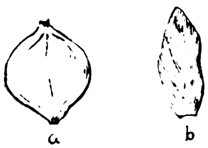


Fig 3

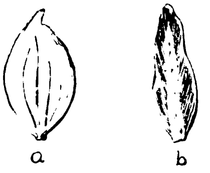


Fig 8

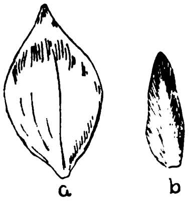


Fig. 4.

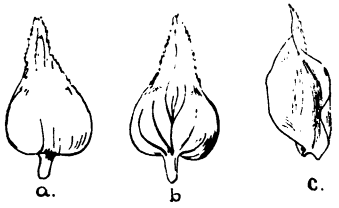


Fig 6

CAREX SPECIES

bracts aristate from a broad scarious base, shorter, or rarely much longer than the heads; scales equalling or exceeding the perigynia, the green midvein excurrent as a short, nearly smooth awn; perigynia castaneous, ovoid, thick, nerved or nearly nerveless, produced at base, 4 mm. long, contracted to a long, serrulate beak; achenes ovoid, 2 mm. long, entirely filling the body of the perigynium.

In marshes of the Coastal subregion. Near Santa Ana, Helen D. Geis. Ostrich Farm, near Los Angeles; Hasse. Acton; Hasse.

Wheelerella

Dr. E. L. Greene writes me that **Piptocalyx** is invalid by reason of a prior genus of the same name, and also that he does not approve of the name **Greeneocharis** proposed by a European author to take its place. Therefore I propose to name the genus in memory of Walter Wheeler, a young amateur botanist of Southern California who was instantly struck dead by lightning on July 25, 1904, while botanizing on the very summit of Mt. San Gorgonio, or "Grayback," the highest peak of the San Bernardino range and about twelve thousand feet above the sea level.

Wheelerella of Borraginaceæ.

Piptocalyx Torrey.

Krynitzkia, sub section **Piptocalyx** Gray.

The genus comprises two diminitive annuals of the **Asperifoliæ** and ranges from Lower California and Arizona through the arid regions as far as British Columbia. They are from one to four inches high and are easily mistaken for Cryptanthes.

Wheelerella circumcissa (H. & A.)

Found sparingly in Los Angeles County mountains and throughout the given range. Seldom over two inches high, in tufts in very dry, sandy soil.

Wheelerella dichotoma (Greene).

So far reported only from Western Nevada. Very similar to the last but somewhat larger and coarser.

GEO. B. GRANT.

Pasadena, Cal.

Diseases of Scale Insects

BY S. M. WOODBRIDGE, PH. D.

There is nothing new or startling in the statement that the human race as well as other members of the animal kingdom have been subject to diseases and sometimes to epidemic diseases that have swept them off by thousands and even millions. Among men the Black Death, Yellow Fever, are examples; among equines, glanders; among bovidia, anthrax and black leg; among porkers, cholera and in the feathered kingdom gape and rupe may be mentioned. Vast sums of money have been spent and litrerly thousands of noble and brilliant men, the world over, have given their whole lives up to a study of these diseases and means of prevention.

It is of comparatively recent date that bacteria have been proved to be the causes of disease, although as early as 1675 Antony van Leeuwenhoek, a Hollander, made discoveries which may be said to be the foundation-work for much that followed, and that has placed bacteriology among the sciences; the trouble with van Leeuwenhoek's work was that it didn't stay discovered.

It was not until a century later that "Plerciz, a physician of Vienna, declared himself a firm believer in the work of van Leeuwenhoek, and based the Doctrine which he taught upon the discoveries of the Dutch observer, and upon observations of a confirmatory nature which he himself had made. The doctrine of Plerciz assumed a casual relation between the micro-organisms discovered and described by van Leeuwenhoek and all infectious. He claimed that the material of infection could be nothing else than a living substance and endeavored on these grounds to explain the variations in the period of incubation of the different diseases. He likewise believed the living contagium to be capable of multiplication, within the body, and spoke of the possibility of its transmission through the air. He claimed a special germ for each disease, holding that just as from a given cereal only one kind of grain can grow, so by the special germ for each disease only that disease can be produced." (Abbott.)

The work and opinions of these scientists were ridiculed and no credence given them by the Medicos of their day.

It was in the 4th and 5th decades of the last century that the true relation of the lower organisms to infectious diseases was scientifically pointed out by Pasteur, Davine and others. The efforts of the bacteriologists, and Medicos in the higher animal world, have been to isolate these diseases, cultivate these germs artificially in the laboratory, identify and classify them and discover means for their destruction, which at the same time, would not destroy the host upon which they were doing their deadly work.

That similar diseases have effected the insect world is an acknowledged fact; the first important work in this direction was done by Dr. Louis Pasteur, in 1870, when the silk worm of Europe was found to be dying, and the silk industry was threatend with destruction, he proved that the disease of the silk worm was due to a bacterium and suggested means for its destruction.

Pasteur's efforts, like those of the medical world, were to destroy the pernicious bacterium, which is quite the opposite of what is necessary in the insect world, as viewed by the orchidist, as the insects are a pest and therefore to be destroyed; hence the necessity of propagating their diseases and disseminating them to the fullest extent.

In 1883 Prof. Forbes gave to the world an account of the work in his laboratory with the disease of the cabbage worm (Piero-rapae).

In his account the Professor showed very clearly that a disease occurred among cabbage worms and that it could be destroyed artificially among these insects.

In the Northwest a disease for the chinch bug has been disseminated to the extent of cutting the injury of that insect down to almost nominal loss.

As early as 1892 D. W. Coquillett of the Division of Entomology, U. S. Dept. of Agri., reported as follows: A few weeks ago Mr. C. H. Richardson, of Pasadena, one of the county inspectors of fruit pests, showed me several pear trees in that locality which a year ago were very thickly infested with these scales [San Jose], as was evidenced by the gnarled appearance of the branches as well as by the dry scales still adhering to the trees. After a careful examination of these scales scarcely a live one could be found. Mr. Richardson assured me that the trees had not been treated with any kind of insecticide and they certainly gave no signs of such treatment. The dead scales gave no signs of having been destroyed by lady birds, nor yet by internal parasites. Wishing to ascertain if this singular mortality was general in other localities, I examined several infested pear trees in this city, but found that the fruit and new growth upon them were thickly infested with scales, which were alive and to all appearance in a very thriving condition. It would appear therefore, that the mortality among the San Jose Scales was entirely due to some low form of fungus growth.

In 1897, the Florida Agricultural Station sent me several cultures and many specimens of a fungus disease (sphaerostilbe coccophila, Tul.) of the San Jose scale. These cultures as well as the diseased scale were very generally distributed throughout Southern California. Whether it was the result of the disease spoken of by Mr. Coquillett or of the imported disease from Florida or both, the fact remains that whereas ten years ago the San Jose scale was one of the worst pests on deciduous trees it is today practically unknown in Southern California.

Diseases of the Red Scale have also been noted in Australia, as well as in the lower part of the State. Attempts to reproduce them and make them destructive in the orchard have not so far been successful. Mr. E. K. Alpaugh, of Los Angeles, who has a ranch at Sunny Sloep, in the San Gabriel Valley, called my attention to the fact that it was much less in his orchard than it had been formerly. A visit to the ranch indicated to me that a disease was attacking his scale and cultures of the supposed diseased scale have been made, but without definite results as yet.

During the summer of 1898, I found on trees in San Bernardino county some black scale (Lecanium oleae), that were evidently diseased.

I brought samples of these scales to our laboratory in Los Angeles, where cultures of the fungus, which was apparently getting in its deadly work, were made. Subsequently many cultures of this fungus were made and were distributed widely through our scale infested districts. In some districts the work was quite effective that season. Mr. A. B. Smith, of San Dimas, had his ranch cleaned up by this fungus. In other places the disease seemed to make little headway.

Believing that a disease is by far the cheapest method of getting rid of our scale pests, this department has persistently continued to make cultures annually, and has distributed them widely through Southern California. These have thrived, more or less indifferent, for a short time and then disappeared. This year the results were quite different, and I find that this fungus disease has been doing effective destruction in many localities, and it would appear to have become acclimated and I trust has come to stay, although it seems to have been "winter killed", for several successive years.

The fungus is grown in Petrie Dishes, i. e., cultures are made of it on pieces of sterilized bread about 2 inches in diameter. When the cultures are made they can be kept a long time, under proper conditions, ready at any desired time for application. At the proper time three of them are mixed with a barrel of water at a temperature of about 70 degrees Fahrenheit. Such a barrel containing 45 gallons of water is enough to spray 1600 trees. I have done this by merely spraying, through an ordinary hand syringe, say one pint of the mixture on a tree. Every fifth tree is enough to put the spray upon.

On one tree at least wet a limb infected with the scale with the mixture and wrap with piece of cloth also wet with the mixture, (a cloth about 2 inches wide and 3 feet long will answer). This cloth should be kept moist for aweek, thus enabling the spores to get a start upon its host. If the fungus gets a start on any tree it will more than likely spread, not only over the orchard, but throughout the neighborhood.

It is evidently desirable that tests should be made as extensively as possible of this method of destroying the black scale, and the work will be continued by this department.

South Pasadena, California, December, 1905.

Vol. V. June, 1906. No. 2

BULLETIN

OF THE

Southern California Academy of Sciences

Committee on Publication:

C. A. Whiting, Sc. D., D. O. A. Davidson, C. M., M. D. Wm. H. Knight

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MAILED SEPT. 11, 1906

On the Ten-Mile Eucalyptus Avenue, Near Santa Monica

TRANSACTIONS

BOTANICAL SECTION.

The Botanical Section met on April 16, 1906.

Dr. Davidson showed specimens of the ferns of Arizona and California. A paper by Dr. Haase on ''Contributions to the Lichen-flora of Southern California'' was read.

T. PAYNE, Secretary.

GEOLOGICAL SECTION.

On Monday evening, April 16th, the Geological Section met at Symphony Hall. The meeting was called to order by B. R. Baumgardt. On motion of G. M. Taber, and seconded by Prof. Dozier, Geo. W. Parsons was elected chairman of the Section for the ensuing year. No election of secretary was held.

The chairman introduced Mr. Oscar H. Reinholdt, late consulting engineer of the United States concessions in the Philippines, who gave a very interesting lecture on the Philippines, and exhibited about 150 slides of the islands and their scenery, also the characteristics of the people. His description was very interesting, and the thanks of the Academy was extended to him.

G. MAJOR TABER, Secretary.

BIOLOGICAL SECTION.

April 9th.

The April meeting of the Biological Section was held in the histological laboratory of the Pacific College of Osteopathy.

In the absence of the Chairman, the Secretary called the meeting to order.

The minutes of the last meeting were read and approved.

As this meeting was the one preceding the election of officers for the Academy, the officers of the Section for the ensuing year were elected.

C. A. Whiting was elected Chairman of the Section and Carle H. Phinney Secretary.

The lecture of the evening was delivered by Miss Susan Stokes, of the Orange High School, on the Relationship between the Molds and Algae. Miss Stokes showed by a striking succession of plants how the molds have probably degenerated from the Algae.

The lecture was followed by considerable discussion which was both entertaining and profitable.

About thirty-five members and visitors were present.

On motion the meeting adjourned.

C. A. WHITING, Secretary.

Additions and Corrections

Vol. 3, page 49.

The authority for **Cyperus bromoides** should be **Link, Jahrb-Berl I,** 3:85.

Vol. 4, page 52.

Pistillate spikes loose, few-flowered.
  Stigmas 2; perigynia pyriform.
    Perigynia coriaceous, green.
      Scales ovate-oblong, equalling the perigynia. 14a. **C. Californica**
      Scales broadly ovate, shorter than the perigynia. 15. **C. Hassei**
    Perigynia fleshy, yellowish................15a. **C. aurea**

Vol. 4, page 110.

***Pistillate spikes few, short, oblong, loosely-flowered, the upper sessile and approximate at the base of the solitary staminate spike, the lowest remote and borne on a long slender stalk; bracts grass-like: sheathing at base; perigynia pyriform or oblong, nerved, beakless; stigmas 2.*

+—Perigynia firm and coriaceous in texture, green.

14a. **Carex Californica,** Bailey, Mem. Torr. Club, 1:9. **C. polymorpha,** W. Boott in Wats. Bot. Cal. 2:247.

Caespitose by slender, naked rhizomes; culms filiform, 5-10 cm. tall; leaves 2-4 mm. wide, nearly equalling the culms; pistillate spikes 2-4, 4-10 mm. long; scales as long as the perigynia, ovate-oblong, mucronulate, brown with broad green midvein; perigynia elongated pyriform.

Described from immature specimens collected July, 1905, at Sawmill Mt., 8,500 ft. alt., Ventura Co., by Mr. H. M. Hall, No. 6518. The type is 4741 **Bolanderi,** collected in Mendocino Co.

15. **Carex Hassei,** Bailey. See page 110.

+ +—Perigynia fleshy, yellowish and more or less translucent when dried, at length brownish.

15a. **Carex aurea,** Nutt. Gen. 2:205. W. Boott in Wats. Bot. Cal. 2:240. Bailey, Proc. Am. Acad. 22:110. Britt. & Br. Ill. Fl. 1:331.

Caespitose; culms smooth, slender and erect, 1-10 cm. tall; leaves flat, 3-5 mm. wide, shorter than the culms; scales hardly half the length of the perigynia, brown with a yellowish midvein, and hyaline margins, broadly ovate, acute; perigynia obscurely nerved, 2 mm. long.

In a meadow, between Bear Valley and Bluff Lake, 7,000 ft. alt., San Bernardino Mts.; 2847 Abrams. San Antonio Mt., near the summit; Mrs. H. E. Wilder. North to British Columbia; also in the Rocky Mts., and in the northern Atlantic states. Readily distinguished from **C. Hassei** by the texture and color of the perigynia.

Errata

A considerable part of this paper was printed without the author's correction of the proof, and contains many typographical errors. Most of these the reader will readily correct, but some, which are less evident, are noted below:

Vol. 3, page 50. Line 8 from bottom; omit **stamens** 3, for **artistatus** read **aristatus.**

Page 52. Line 15, for **mm.** read **cm.**

Page 113. Line 7, for **C. triangularis** read **S. triangularis.**

Vol. 4, page 66. Line 24, for 3/8 read **3-8.**

Page 67. Line 24, for ++read++++
Line 32, for **cm.** read **mm.**
Last line, for **olivanceous** read **olivaceous.**

Page 80. Line 4, prefix +–+–
Line 29, prefix **
Line 32, prefix +–

Page 82. Line 16, prefix +–+–
Line 19, prefix ++
Last line, for +–+– read ++++

Page 114. Line 1, for **spikes** read **spike.**
Line 2, for **achems** read **achenes.**
Next to last line, omit **then.**

Vol. 5, page 24, line 12, for accuminatatis read accuminatis.
Page 26, line 4. After Plate XXII insert Fig. 6.
The Plate on page 25 should be numbered Plate XXI; that on page 27 Plate XX.

A Butterfly New to Southern California

BY PROF. J. J. RIVERS, SANTA MONICA

Eudimus proteus. A wanderer over many lands made a visit in force to Santa Monica and was to be seen regalizing its taste at the inflorescence of many different plants. It, however, was partial to arboresent places near bean fields. The species has not been noticed in California before last season, and whether it will become a regular resident is problematic, as it has a range from New York through all the southern states, Mexico, and several states in Central America.

Mr. G. W. Wright informs me that this species of butterfly occurred commonly last season in San Bernardino county as well as along the country bordering on Mexico. Mr. Stevens reports its appearance at San Diego.

* * *

Contributions to the Lichen-Flora of Southern California

BY DR. H. E. HASSE

Acolium tigillare, (Ach.) DeNot. On a dead shrub near Marietta Hot Springs. Foothills near Stanford University. (C. F. Baker).

Collema fasciculare, Hoffm. On bark, S. M. range.
Crombie, Bri. Lich. I. p. 56.
Nyl. Syn. Lich. I. p. 115.

C. coccophorum. Tuck Earth at Palm Springs and Murietta Hot Springs, Riverside county. San Gabriel Canyon, Los Angeles county.

Collemopsis Arnoldiana, Nyl. Among moss on rocks, Strawberry valley, San Jacinto Mts.

Pyrenopsis melambula, Tuck. On clay, foothills near Casa Verdugo, Los Angeles county.
Tuck. Syn. N .A. Lich. I. p. 136.

P. phaeococca, Tuck. On sandstone in S. M. range,—Santa Cruz Mts.
(A. C. Herre).

Collemodium fragile, Nyl. Thallus minute, scattered, black. Apothecia brown, ureceolate. Sp. muriform, decolorate, 28 to 36 micros. long, 15 to 16 micros thick. Slate rocks S. M. range.
Cromb. 1. c. p. 65.

Cladonia sobolifera, Nyl. S. M. range.
Cromb. 1. c. p. 134.

Leptogium pusillum, Nyl. North Fork Matillija Canyon, Ventura county.
Cromb. 1. c. p. 65.

C. fimbriata, Fr Subsp. C. fibula, Nyl. var. subcornuta, Nyl. Foothills of San Gabriel range.
Cromb. 1. c. p. 138.

Usnea dasypoga scabrata, Nyl. Shrubs, S. M. range. Cataline Isle.
(Blanche Trask). No Apothecia have been seen.

Ramalina linearis, (R. canaliculata. Tal.)
Shrubs, S. M. range.

R. calicaris fastigiata, Fr. Trunks, San Gabriel range.

Parmelia saxatilis, Ach. f furfuracea, Shaer. On granite, Mt. Wilson.
Cromb. 1. c. p. 241.

P. prolixa panniformis, Nyl. Rocks, Yosemite Valley.

P. flavicans, Tuck. Rocks, S. M. range.

Physcia pulverulenta, Nyl. f. argyphaea. Nyl. S. M. range.
Cromb. 1. c. p. 306.

Ph. pulverulenta, Nyl. Subsp. Ph. isidiigera, Zahlbruckner. Subsp. nov. First discovered by Prof. A. C. Herre in the Santa Cruz mountains. North Fork Matilija Canyon, Venture county, and San Jacinto Mountains.
A. C. Herre: "The foliaceous and fruticose Lichens of the Santa Crux Peninsula, Cal." —Washington, 1906. P. 362.

Ph. adglutinata, Nyl. f. sorediata, Nyl. On Juglans in S. M. range.
More frequent than the type.
Cromb. 1. c. p. 321.

Ph. tribacea, (Ach.) Tuck. On rocks, S. M. range. Sterile.

Ph. leucomela. (L.) Michx. Catalina Island on twigs. (Blanche Trask.)

Theloschistes ramulosus, Tuck. on various barks, S. M. range. Near Stanford University. (C. F. Baker.) Santa Cruz Peninsula. A. C. Herre. L. c. p. 349. It is easily overlooked.

Omphalaria symphorea, (D. C.) Spores round-ellipsoid, 8 micros. long, 6 micros. thick, about 20 in asci.
Palm Springs, Riverside County.

Pannaria sonomensis, Tuck. On rocks, Yosemite Valley (sterile) and North Fork of Matilija Canyon, Ventura county in fruit.

Placodium murorum, (Ach.) Subsp. Pl. tegularis, Nyl. var. obliterascens, Nyl. Rocks San Gabriel Canyon.
Cromb. I. c. p. 361.

Pl. fulgens, (Sw.) D. C. On earth, Palm Springs, Riverside county.

Lecanora pelicypha, Nyl. Thallus of bright-chestnut shining sqamae (K.. Apothecia immersed, small finally enlarging, disk, brown, flat. San Bernardoin Mts. "Prospect Peak" near Seven Oaks, also at Wilson's Peak, San Gabriel range.
Cromb. L. C. p. 483.

L. rugosa, Nyl. On barks, Catalina Island, (Blanche Trask) and S. M. range.

L. gangaleoides, Nyl. On sandstone near Adamana, Arizona.
Cromb. p. 316.

L. Polytropa, Shaer. f. subglobosa, Cromb. on sandstone, S. M. range. Cromb. I. c. p. 438.

L. polytropa illusoria, Auctt. San Bernardino Mts. (S. B. Parish.)

L. calcarea contorta, Fr. f. monstrosa, Cromb. Sterile, S. M. range. Cromb. I. c. p. 474.

L. glaucocarpa depauperata, Cromb. S. M. range.
Cromb. 1. c. p. 481.

L. simplex, Nyl. f. **complicatum,** Cromb. S. M. range.
Cromb. I. c. p. 490.

L. simplex, Nyl. f. **complicatum,** Cromb. S. M. range.
Cromb. I. c. p. 490.

L. simplex, Nyl. f. **strepsodina,** Ach.
Cromb. I. c. p. 490.
Both forms occur on quartzose rocks in the San Gabriel and Santa Monica ranges.

L. Bockii, (Fr.) Th. Fr., Rocks, San Antonio Canyon.

Pertusaria leioplaca, (Ach.) Shaer. On Juglans, S. M. range.

P. ambigens, (Nyl.) Tuck. On Umbellularia near the old Sturtevant camp, San Gabriel range.

Biatora conglomerata, (Fr.) On charred bark of a conifer, San Gabriel range and on dead wood of Arctostaphylos in S. M. range.

B. Nylanderi, Anz. On pine bark in San Gabriel Canon.

B. Friessii, (Ach.) Decorticated pine logs, Strawberry valley, San Jacinto Mts.

B. punctella, Willey. Thallus obsolete, apothecia minute, convex, immarginate, light brown. Spores 8 nae, simple, ellipsoid 8 micr. long, 4 micr. thick. Parapyhses separate with pale brown, blobular heads. Asci oblong, 24 micr. in length, 10 micr. thick. Hymenium (Thecium of Darbishire) 32 to 34 micr. high, hypothecium colorless. Hym. gel. stained pale blue with jodine. On decorticated wood of Sambucus glauca, S. M. range.

B subviridis, (Nyl.) On slate rock, S. M. range.
Leighton Li. Flora Gr. Bri. 3 edit. p. 331.

B. prasina, Fr. Soldiers' Home grounds on bark of fig trees.

B. sylvana, Ach. Twigs on Catalina Island.
Leight. 1 c. p. 264. (B. minuta.)

B. viridescens, (Schrad.) Fr. Spores oblong-ovoid, 12 micr. long, 4 micr. thick. Bark of Pseudotsuga, San Gabriel range along the old Wilson trail.
Tuck, 1 c. part II, p. 17.

B. Schweinitzii, Fr. On Heteromeles, S. M. range.

B. atro-grisea, (Dicks.) Hepp. On Umbellularia in the San Gabriel range.

B. fusco-rubella, Hoffm. On Rhus diversiloba, canons of S. M. range.

B. moriformis, (Ach.) Bark of pines, San Gabriel range and San Bernardino Mts. near Seven Oaks.
Tuck. 1. c. Part II, p. 50.

Lecidea lenticularis, Ach. f. ecrustacea, Hepp. On sand stone, Catalina Isle.
Leight. 1. c. p. 336.

L. contigua, Fr. f. calcarea, Fr. Frand Canon, Arizona.
Leight. 1. c. p. 300.

L. tesselata, Flk. On granite, San Jacinto Mts.

L. chalybeia, Borr. Rocks, North Fork of Matilija Canon, Vent. Co.
Leight. 1. c. p. 326.

L. cruciaria, Tuck. On sand rock in same locality as the last.

L. polycarpa, Fr. On rocks in S. M. R. near Hollywood.

L. morio, Shaer. Thallus of small brown, convex equamules, bordered by a conspicuous black hypothallus. On gran-

L. sarcogyniza, Nyl. On rocks near Claremont. (C. F. Baker.)
Ltight. 1. c. p. 312.

L. pycnocarpa, Koerb. On rocks, S. M. range.

Arthonia pyrrhuliza, Nyl. Apothecia brown, radiating or sinous. Spores 3 to 4 septate, 22 micr. long, 8 micr. thick, the upper locule the largest. Catalina Isle on Prunus illicifolia integrifolia.
Willey. Syn. Arth. No. 84.

A. epipastoides, Nyl. On Juglans, S. M. R.
Willey 1. c. No. 264.
Leight. 1. c. p. 420.

A. polygramma, Nyl. Thallus white, somewhat mealy or scaly. Apothecia immersed, brown, white pruinose, palmate or sinuate. Spores 4 to 5 septatt, 22 micr. long, 7 thick. Catalina Island on Rhus integriflia.

A. impolita chiodectonoides, Tuck. On Almus rhombifolia in S. M. R.

A. gregaria, (Weig.) Kbr. f. concolor, T. & B. Soldiers Home grounds on cultivated shrubs.
Willey 1. c. No. 43.

A. gregaria pruinata, Delis. Catalina Island on Oak. (Blanche Trask.)
Willey 1. c. No. 43.

A. adveniens, Nyl. Thallus light ash colored or almost white. Sp. colored, 5 to 6 septate and some cells divided longitudinally, 24 micr. long and 12 micr. thick. On Juglans. In canons of S. M. range.
Willey 1. c. No. 329.

A. polymorpha, Ach. Thallus ash colored, rimulose, indistinctly bordered by a black line. Sp. 3-septate, oblong-ovoid, with both end cells the larger. On Rhus laurinum in S. M. R.
Willey, 1. c. No. 248.

A. interveniens, Nyl. Thallus ash colored. Apothecia brownish-black, round of irregular out of line. On Platanus, Sambucus and rhus. S. M. range.

A. quintaria, Nyl. On Aplopappus ericoides, bluffs near Playo del Rey. Thallus white, apothecia black, substellate. Spores oblong, 5 to 7 septate, the cell at thick end the largest, 24 micr. long, 10 micr. thick. Asci 52 micr. long, 28 thick, pyriform. Hym. gel. with jodine stained a dirty yellow.
Willey, 1. c. No. 248.

A. radiata angustata, Willey. On Quercus agrifolia in S. M. range. In 1895 I submitted a Lichen from oaks of Catalina Isle t othe late Dr. Stizenberger, who named it A. tetramera. Both Lichens are similar in appearance and the spores are alike in septation, size and form.

Opegrapha prosiliens, Strn. Thallus sordid white. Lirellae oblong brown-black. Sp. 3-septate, blunt fusiform, colorless with a thick gelatinous epispore, 24 micr. long, 7 thick. Paraphyses slender, branching. Hymenium about 80 micr. high. Asci 72 micr. long, 18 micr. thick. On Juglans in S. M. range.
Leight. 1. c. p. 403.

O. varia, Pers. f. **pulicaris,** Lightf. On Quercus in S. M. range.
Leight. 1. c. p. 404.

O. varia, Pers. f. **tridens,** Ach. On Juglans, S. M. range.
Leight. 1. c. p. 405.

O. constrictella, Strn. On twigs, San Diego. (R. D. Alderson.)

Endocarpon conyumescens, Nyl. Sp. 12 to 14 micr. long, 8 to 10 thick.
On granite near Elsinore.
A. Hue, Addenda Lichenogr. Europ. 1886. No. 1658.

E. Garovaglii, Mnt. On rocks at head of Bright Angel trail, Grand Canon, Arizona.
Leight. 1. c. p. 491.
Nyl. Envir. Paris, 1896, p. 117.
Hue, 1. c. No. 1665.

E. adnatum, Nyl. Thallus squamulose, sinuately lobed, reddish-brown, beneath dark, the squamules 4 to 5 mm. in diameter. Sp. faintly colored, 40 to 50 micr. long, and 16 to 20 thick, ovate oblong, muriform. On earth, Palm Springs.
Hue, 1. c. No. 1668.

E. pallidum, Ach. Thallus of pale-rufous, small squamules. Spores 2, not uniform in shape or measurements, decolorate to pale brown, broadly oblong, 4 8to 58 micr. long, 22 micr. thick, and narrowly oblong, 80 to 96 micr. long, 16 to 18 thick, muriform with about 11 transverse septa and 5 longitudinal. Asci 144 micr. long and 24 micr. thick. The upper, thick fundus of the ascus being occupied by the thick spore, the lower attenuated end by the narrow oblong one. On earth at Elsinore and on disintegrated granite at Palm Springs.
Hue, l. c. No. 1664.
Leight. l. c. p. 491. (Verrucaria.)

E. tephroides, (Ach.) v. cartilagineum, Nyl. Thallus cartilagineous of undulating, imbricated, brown squamae, the margin lobate and crenate, toward the circumference tending to beeme radiate. Apothecium indicated as a projecting dark spot with a minute puncture at apex. Sp. simple, colorless, ellipsoidal, 20 to 26 micr. long by 8 to 10 micr. thick. On earth among moss on rocks, San Gabriel range, along the old Wilson trail.
Leight. l. c. p. 459. (Verrucaria.)

Heterocarpon, ochroleucum, (Tuck.) On granite, Palm Springs.
Tuck. Syn. l. c. Part II. p. 138.

Enndococcus erraticus, Nyl. Minute apothecia. Sp. brown, numerous about 24 to 32, one-septate, ellipsoid, 10 micr. long, 4 thick. Paraphyses absent, asci oblong. Parasytic upon thallus of Lecidea lapicida. San Gabriel Canon, Los Angeles Co. Nyl. Exot. 1892.

Hue, l. c. No. 1897.
Leight. l. c. p. 496. (Verrucaria.)

Verrucaria muralis, Ach. f. epipolia, Nyl. (Det. by Dr. Nylander.) Thallus scurfy, thin, sordid white. On calcite, San Gabriel range.

V. circumspersella, Nyl. Thallus white, pulverulent, effigurate. Apothecia prominent, black, shining. Sp. ellipsoid, 3-septate, 24 to 26 micr. long, 7 to 8 thick. Asci tubulra. Paraphyses distinct, capillary, with odine faint yellow. Calcareous rock, Malibu Conon, S. M. range.
Hue, l. c. No. 1755.

V. epidermis, Ach. Thallus white, mealy, apothecia semi-globular, covered by thallus. Sp. 1-septate, the two cells constricted and at times falsely septate at constriction. Paraphyses stout, articulated, branching. On Euphorbia misera, San Clemente Island. (Blanche Trask.)
Leight. L. C. p. 463.

V. epidermidis cinerea-pruinosa, Schaer. On Platamus, S. M. range.
Leight. l. c. p. 464.

V. epidermis apalepta, Ach. Soldiers' Home grounds on Grevillea.
Leight. l. c. p. 463.

V. chlorotica, (Ach.) On Frazinus dipetala, San Gabriel Canon.
Leight. l. c. p. 472.
Hue, l. c. No. 1773.

V. chlorotica, (Ach.) f. **trachona,** (Taylor.) Thallus pulverulent. Sp. 3-septate, fusiform, 27 to 30 micr. long, 8 micr. thick. Argillaceous rock, S. M. range.

V. conturmatula, Nyl. Thallus absent. Sp. 1-septate, 16 micr. long, 8 thick. Paraphyses indistinct. On quartz, San Gabriel Canon.
Hue, l. c. No. 1838.

V. punctiformis diminutula. Nyl. Sp. 1-septate, 22 to 28 micr. long, 7 to 7½ thick. On oak, Strawberry Valley, San Jacinto Mts.
Hue, l. c. No. 1845.
Leight. l. c. p. 467.

V. cerasi, (Ach.) On Malvastrum fasciculatum, S. M. range.
Leight. l. c. p. 471.
Hue, l. c. No. 1849.

V. integrella, Nyl. Sp. smaller than those of V. integra, of which it is made a subspecies by Nylander. On earth, (forma terrestris.) S. M. range.
Hue, l. c. No. 1729.

V. microbola, Tuck. Thallus mealy, thin, areolate-diffract. Apothecia small, black, depressed globular with a minute aperture. Spores colorless, 3-septate, ellipsoid, 28 micr. long, 16 thick.
Paraphyses none or indistinct. On calcareous rock, Mill Creek Canon, San Bernardino Mts.

V. margacea acrotella, Ach. Rocks, S. M. range.
Leight. l. c. p. 448.

V. cinerea, (Pers.) On Rhus diversiloba, S. M. range.
Leight. l. c. p. 464.

V. achrostoma, Borr. Thallus brownish-black, areolate. Apothecia apparently entire, immersed with a small black osteolum. Sp. 8 nae, simple, colorless, 1-nucleolate, ovoid ellipsoid, epispore delicate, 18 micr. long, 8 thick. Asci 56 micr. long, 20 thick. Paraphyses absent. With Jodine the Hymenium is stained dull violet. On sandstone, Ballona Bluffs, Los Angeles Co.
Leight. l. c. p. 454.

V. fusco-cinerascens, Nyl. Parathecium dimdiate, sp. ellipsoid, simple, oblong, 30 micr. long, 7 thick. Rocks, Malibu Canon, S. M. range.
Leight. l. c. p. 451.

A Few Words on Tumors

C. A. WHITING, SC. D., D. O.

The pathologist frequently receives vomitus, pus and various kinds of scrapings, for examination, to determine the presence or absence of "cancer cells." The laity practically unite in believing that cancer cells materially differ from all normal cells, and this belief is held by many physicians who have not had careful training along the line of structural pathology.

There are two laws relating to abnormal growths which are the keys to all correct thinking and reasoning. The first is that all cells of whatever nature found in the body have been derived from pre-existing cells, and the second is that the tissue which forms a tumor of any kind resembles in its general structure tissue which is normal to either the adult or embryonic body. These two statements being true, it will readily be seen that it is by no means easy to exactly define a tumor, as almost any part of the body is subject to more or less hypertrophy or overgrowth. For practical purposes a hypertrophied condition means not only an increase of the part in size, but also in function, while the term tumor means an increase in size with no corresponding increase in function. A forcible illustration of these two conditions may be drawn from a normal and an abnormal accumulation of fat. Even a normal accumulation of fat may be very much localized, as when, for instance, it is chiefly confined to the omentum, but however localized a normal accumulation of fat may be, it is readily utilized when demanded by the necessities of the body, but a lipoma or fatty tumor remains practically unaffected by the needs of the body, even if these needs press to the point of starvation.

A hypertrophied gland is capable of more functional activity than a strictly normal gland, as, for example, the highly hypertrophied mammary gland of the domestic cow compared with the strictly normal gland of the buffalo cow, while a gland enlarged by an adenoma—a gland like tumor—is never more active and usually much less active than a strictly normal gland.

Pathologists recognize two distinct kinds of tumors, those which are formed from epithetical cells and those which are formed from connective tissue cells. Cancers belong to the first class.

Tumors of both classes closely resemble normal tissue in their nutrition, and they usually have about the same nerve supply. As the tumor increases in size, the blood supply is more or less affected and thus the cells composing the tumor are placed in a changed environment, which quickly reacts upon their structure and function.

Owing to this fact, the clear distinction between cells of different tissues, which exists in normal structures, becomes more or less obliterated and in many cases these distinctions become so illy defined that the positive identification of a given tumor becomes a matter of extreme difficulty or in some cases an impossibility.

I am aware that the foregoing statements are quite out of harmony with the views of many writers and lecturers on Pathology, but I believe that the laboratory experience of practical workers is in harmony with the views expressed.

A Preliminary Synopsis of the Southern California Cyperaceæ. XII.

BY S. B PARISH

(Continued from page 20, Vol. 5)

Section 2. HYPARRHENÆ, Fries, Summa, 72. Staminate flowers borne at the base of the spikes, or, in a few species, variously intermingled with the pistillate, or whole spikes staminate or pistillate, or plants diœcious.
** Staminate flowers not always confined to the base of the spikes; perigynia brown, ovoid, or nearly so, firm, obviously distended over the achenes.*
+—Spikes 2-4, distant, 3-9 flowered, perigynia wingless, stellately divergent at maturity.

29. **Carex stellulata ormantha,** Fernald, Rhodora, 3:222. **C. echinata ormantha,** Fernald, Proc. Am. Acad. 37:483, t. 4, f. 8, 9. **C. echinata, W. Boott** in Wats. Bot. Cal. 2:237, in part.

Culms filiform, smooth, 1-3 dm. tall; leaves erect, about 1 mm. wide, shorter than the culms; bracts scarious, or the lowest aristate; terminal spike clavate by the attenuation of the staminate flowers, the others subglobose, and mostly wholly pistillate; scales brown, nearly as long as the perigynia, ovate-acuminate; perigynia narrowly ovoid, nerved or nerveless on the inner face, 3-4 mm. long, the bidentate, serrulate beak nearly as long as the body.

In a wet meadow, at Bluff Lake, 7,400 ft. alt., San Bernardino Mts., June, 1894, 1895; 3274, 3703 Parish. Northward in the Sierra Nevada to Oregon; also in New England. The type was collected in the mountains of El Dorado county, by Dr. Brainerd. The plant is reported to be sometimes dioecious.

Plate XXIII. Fig. a. Immature head.

+—+—Spikes larger, 4-7, distant, or the uppermost loosely clustered; perigynia thick, wingless, erect.

30. **Carex Bolanderi,** Olney, Proc. Am. Acad. 7:393. Fernald, Proc. Am. Acad. 37:491. **C. Deweyana Bolanderi,** W. Boott in Wats. Bot. Cal. 2:236. Bailey, Proc. Am. Acad. 22:146.

Culms slender, roughish above, 5-10 dm. tall; leaves flat, short-pointed, 3-5 mm. wide, shorter than the culms; bracts scale-like, 1-2 of the lowest usually aristate; spikes oblong to ovoid, acute, about 1 cm. long, the uppermost staminate at base the others usually entirely pistillate; scales light brown, as long as the perigynia, scarious, rough-cuspidate by the extrusion of the green midvein; perigynia nerved on the back, 3-4 mm.

long, contracted to a narrow, deeply bidentate beak, half as long as the body; achenes castaneous, lenticular, broadly ovoid, 1.5 mm. long.

Mill Creek Falls, 6,000 ft. alt., San Bernardino Mts., July, 1892; 2486 Parish. The southern limit, thence northward, in the Sierra Nevada Mts., to Washington.

Plate XXIII. Fig. b.

+++*Spikes 3-4, contiguous in a linear-oblong head.*

31. **Carex praegracilis,** W. Boott, Bot. Gaz. 9:87. Bailey, Proc. Am. Acad. 22:144.

"Stem (the lower part and stem leaves wanting) 26 in. high, straight and slender, scarcely half a line broad on the side, the sharp angles rough above. Sterile leaves thread-like, convolute, the cross-section exactly circular. Spike ferrugineous, oblong-linear, one-half inch long, of 3-4 contiguous, sessile spikelets, the uppermost club-shaped, male at base, the others elliptical, female, few-flowered. Bracts from an ovate, hyaline-margined base, which encircles the stem, tapering to rough, somewhat spreading awns, which are longer than their spikelets, and commonly shorter than the stems. Scales similar to the bracts, with broader margins and shorter awns, covering the perigynia. Perigynia cartilaginous, ferrugineous, pale at base, glabrous, ovate, acuminate-beaked, slightly stalked, 1½ lines long, ¾ lines broad, long-fissured on the outer face (the margins of the fissure whitish), convex on the outer face, the margins of the inner face incurved and serrate above, obscurely nerved. Nut chestnut, round-ovate, biconvex, filling the perigynia. Stigmas 2. Style included.

"San Diego, California, Miss Scott, 1880."

The above is the description of the type. It is not known in what part of San Diego county it was found, nor has the plant been rediscovered. The original and only specimen, apparently at best incomplete, is now in a fragmentary condition, in the Gray herbarium, except for a few fragments which are in Dr. Bailey's herbarium. Its rediscovery is much to be desired. Mr. Fernald is of opinion that it may be a Kobresia, rather than a Carex.

Plate XXII. Drawn at the Gray herbarium, from the type specimen, by Mr. P. B. Whelply, under the direction of Mr. M. L. Fernald. 1, 2, Scales 3, Bract. 4, 5, 6, Perigynia, from the pocket on the sheet. 7, 8, 9, Spikes. All are enlarged 10 diameters.

++++*Spikes 3-10, loosely clustered in an irregular oblong head, 1-3 of the lowest spikes often more or less separated; perigynia strongly convex on the outer faces, the narrow wing, more or less incurved.*

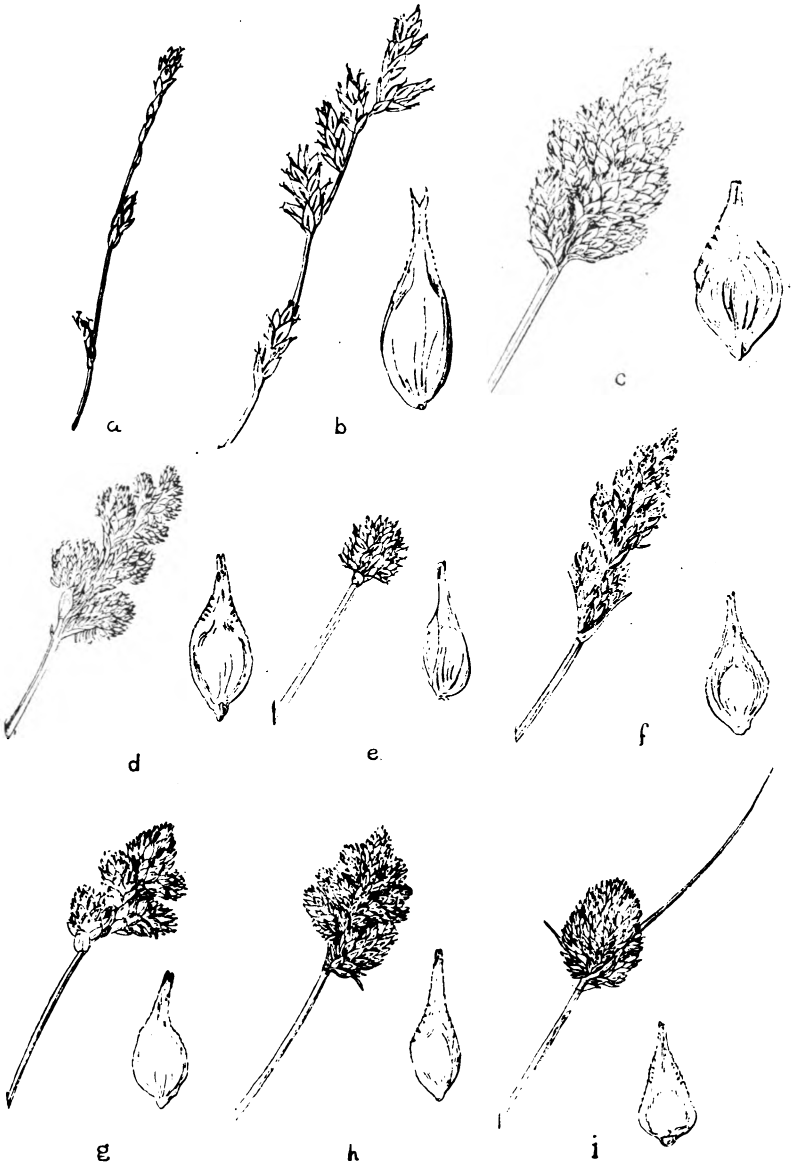

PLATE XXII.

32. **Carex siccata,** Dewey, Silliman's Jour. 10:478. W. Boott in Wats. Bot. Cal. 2:230. Bailey, Proc. Am. Acad. 22:147. Britt. & Br. Ill. Fl. 1:355. Fernald, Proc. Am. Acad. 37:469, t. 1, f. 9-11.

Rhizome covered with brown scales; short-jointed, extensively creeping; culms slender, rough above, 2-6 dm. tall; leaves 1-2 mm. wide, mostly somewhat shorter than the culms; lowest bract usually short-awned; spikes oblong, 2-4 cm. long; scales nearly as long as the perigynia, ferrugineous, ovate-lanceolate; perigynia few-nerved on the outer face, 3-4 cm. long, contracted to a narrow, serrulate, obscurely bidentate beak half as long as the body; achenes brown, lenticular, ovoid, 1.5 mm. long.

Common in the Cismontane region, in damp, subalkaline soil. Los Angeles; Abrams, Davidson. Pasadena; McClatchie. Peat lands, Orange Co., Helen D. Geis. San Diego; Chandler. San Bernardino; Parish. Northward to the Columbia river, and widely distributed throughout North America, from the latitude of Ohio to Ontario. Also in Northern Asia.

***Spikes all staminate at base only, compacted, or more or less distinct in large heads, except No. 35.*

+—Spikes, greenish, perigynia pallid, or greenish, ovoid, conspicuously wing-margined; bracts inconspicuous, shortly aristate from a scarious base

33. **Carex feta,** Bailey, Bull. Torr. Club, 20:418. **C. straminea mixta,** Bailey, Proc. Am. Acad. 21:151. **C. lagopodioides,** W. Boott in Wats. Bot. Cal. 2:237. **C. scoparia fulva,** W. Boott, l. c., in part. **C. adusta,** W. Boott, l. c. 2:238. **C. cristata mirabilis,** W. Boott, l. c.

Culms stoutish, smooth, 3-6 dm. tall; leaves flat, 3-5 mm. wide, shorter than the culms; spikes 5-10, silvery-green, closely imbricated, ovoid to ovoid-oblong, 3-4 cm. long, distinct in an oblong, or compacted in a shorter ovoid head; scales nearly equalling the perigynia, oval, acute; perigynia obscurely nerved on the outer face, serrulate on the margin half way to the base, 3-4 mm. long, gradually attenuate to a flat, obscurely bidentate beak, one-third the length of the body; achenes castaneous, ovoid, lenticular, 1 mm. long.

San Jacinto Mts.; Hasse. Tahquitz Valley, 7,000 ft. alt., July, 1891; Fuller's Mills, 6,800 ft. alt.; 2439, 2561 Hall. Strawberry Valley, 5,700 ft. alt.; Jepson & Hall. San Bernardino Mts., in Waterman Canyon, 3,000 ft. alt., Aug., 1891; 2514 Parish.

Plate XXIII. Fig. c.

34. **Carex specifica,** Bailey, Mem. Torr. Club, 1:21. **C. scoparia fulva,** W. Boott in Wats. Bot. Cal. 2:237, in large part. Bailey, Proc. Am. Acad. 22:148.

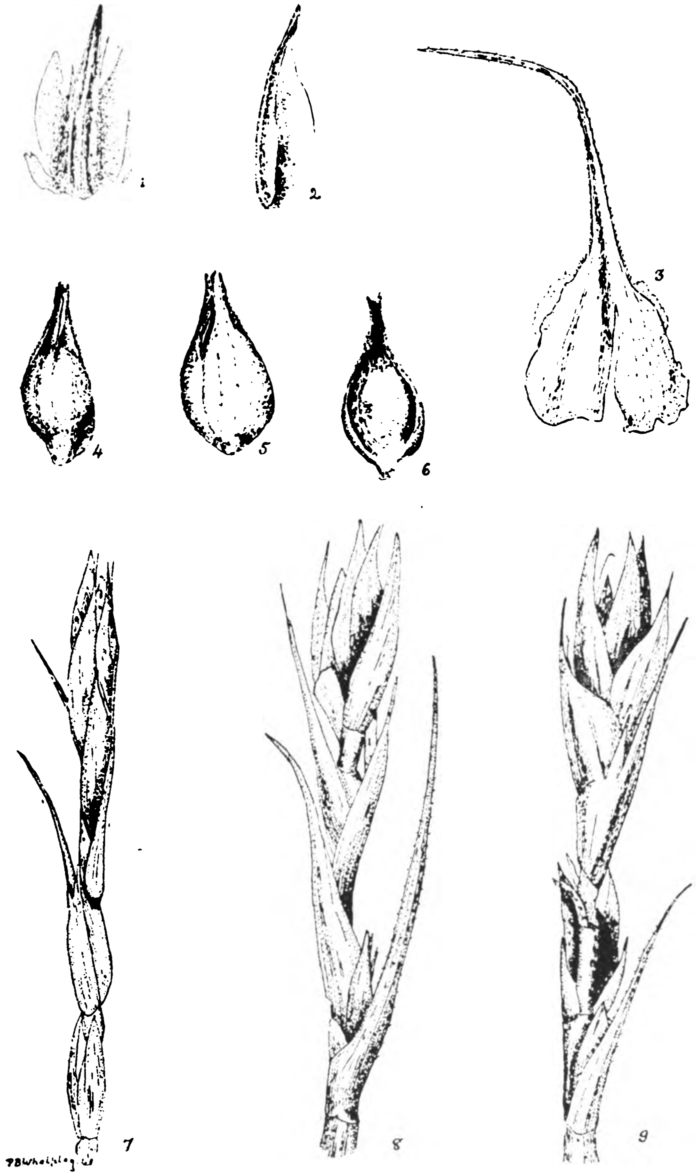

PLATE XXIII.

Culms stout, slightly roughened at the top, 5-7 dm. tall; leaves short-pointed, 5-6 mm. wide, shorter than the culms; spikes 5-10, ovoid-oblong, 7-15 mm. long, loosely imbricated, distinct, clustered in an ovoid or ovoid-oblong greenish-brown head, 3-4 cm. long; scales nearly as long as the perigynia, brown, with green midvein, sharply acuminate; perigynia serrulate on the margin nearly to the base, nerveless, about 4 mm. long, narrowed to a flat, bidentate beak, nearly as long as the body; achenes oblong, lenticular, 1.75 mm. long.

In wet meadows in the Nevadan region, San Bernardino Mts. Fredalba Park, 5,600 ft. alt.; S. Grout. Deep Creek; 2767 Abrams. Mill Creek, 5,000 ft. alt.; Bear Valley, 6,500 ft. alt.; Strawberry Valley, 5,200 ft. alt.; Little Bear Valley, 4,500 ft. alt.; 1161, 3609; 2930, 1698 Parish. San Jacinto Mts. Strawberry Valley, 5,250 ft. alt.; Fuller's Mills, 6,800 ft. alt.; 2665, 3609 Hall. Allen's Camp, 4,500 ft. alt.; Hasse.

Plate XXIII. Fig. d.

+–+ *Spikes brown or tawny.*

++*Heads small; perigynia loose at maturity, brown, thick, wingless and smooth on the edges, the orifice of the narrow beak entire, or obscurely toothed,*

35. **Carex illota,** Bailey, Mem. Torr. Club, 1.15. **C. Bonplandii angustifolia,** W. Boott in Wats. Bot. Cal. 2:233. Bailey, Proc. Am. Acad. 22:153.

Culms erect, slender, nearly smooth, 6-40 cm. tall; leaves 1-2 mm. wide, shorter than the culms; the inconspicuous bracts awnless; spikes 3-6, ovoid, 2-4 mm. long, compacted in a dark brown, globose, ovoid or short oblong head, 5-10 mm. long, 5 mm. thick; scales shorter than the perigynia, brown, ovate, acute; perigynia dark brown, ovoid to ovoid-lanceolate, spongiose at base, 2-3 mm. long, the beak nearly as long as the body; achenes oval, plano-convex, mucronalate, 1 mm. long.

In wet meadows, Bluff Lake, 7,500 ft. alt., in the San Bernardino Mts.; June, 1894; 3273 Parish. Northward throughout the Sierra Nevada to Oregon; also in Colorado.

Plate XXIII. Fig. e.

++++*Heads larger; perigynia pallid, thin and scale-like, the winged margins serrulate, and the flat beaks more or less deeply bidentate; achenes lenticular, orbicular to oblong, about 1 mm. long.*

=*Bracts inconspicuous, muticous or short awned from a broad, scarious base, all but the lowest usually rudimentary or wanting.*

36. **Carex Preslii,** Steud. Pl. Cyp. 2:42. Bailey, Mem. Torr. Club, 1:52. **C. leporina Americana,** Olney, Proc. Am. Acad. 7:407. Bailey, Proc. Am. Acad. 22:152.

Culms erect, unequal, slender, smooth, or nearly so, 1-3 dm. tall; leaves stiff and erect, long-pointed, 1-2 mm. wide, shorter than the longer culms; spikes 5-10, oblong, 4-5 mm. long, distinct in an ovoid, or ovoid-oblong cluster, 1-2 cm. long; scales as long as the perigynia and broader, ovate, acute; perigynia erect, ovoid to ovoid-lanceolate, serrulate nearly to the base, 2.5-3.5 mm. long, the beak one-third as long as the body.

Growing among rocks, at the summits of the highest mountains. San Antonio, 10,080 ft. alt. and San Gorgonio (Grayback) 11,485 ft. alt., Mrs. C. M. Wilder. San Jacinto, 10,800 ft. alt.; 2416 Hall. An alpine species, ranging north to Alaska; also in Colorado and Utah. Mr. Brandegee has collected it on San Pedro Martir Mt., in Lower California, its probable southern limit. The type was from Nootka Sound.

Plate XXIII. Fig. f.

37. **Carex subfusca,** W. Boott in Wats. Bot. Cal. 2:234, Bailey, Proc. Am. Acad. 22:153.

Culms slender and erect, 3-5 dm. tall; leaves long-pointed, about 2 mm. wide, much shorter than the culms; spikes globulose, 3-5 mm. thick, distinct, 5-7 in an ovoid head, 1-2 cm. long; scales brown, a little shorter than the perigynia, ovate, acute; perigynia ovoid, very obscurely nerved on the outer face, 2.5-3 mm. long, contracted to a serrulate beak as long as the body, the orifice merely toothed.

Cuyamaca Mts.; June, 1896; Brandegee. Borders of Cuyamaca reservoir, June, 1903; 3876 Abrams. Round Valley, 9,500 ft. alt., San Jacinto Mts., June, 1903; Hasse. Bear Valley, 6,500 ft. alt., June, 1894; 3772a Parish.

Plate XXIII. Fig. g.

38. **Carex festiva stricta,** Bailey, Mem. Torr. Club, 1:51.

Culms, unequal, slender, smooth, 2-9 dm. tall; leaves long-pointed, 2-4 mm. wide, shorter than the longer culms; spikes 5-9, ovoid, 3-5 mm. long, closely aggregated in a light brown, broadly ovoid or subglobulose head, about 2 cm. long; scales as long as the perigynia and as broad, ovate-acuminate; perigynia narrowly ovoid, nerveless, or obscurely nerved on the outer face, serrulate to the base, 3.5-4 cm. long, narrowed to a beak one-half to one-third as long as the body.

San Jacinto Mts.; Dr. Hasse. Lake Surprise, 8,200 ft. alt., Aug., 1901; 2492 Hall. San Bernardino Mts., Bear Valley, 6,500 ft. alt., June, 1886, 1892, 1894; 1783, 2529, 3270 Parish. Northward in the Sierra Nevada to Oregon.

Plate 23. Fig. h.

= =*Bracts conspicuous, erect, green, aristate, scabrid, usually much surpassing the heads.*

39. **Carex athrostachya,** Olney, Proc. Am. Acad. 7:393. W. Boott in Wats. Bot. Cal. 2:234. Bailey, Proc. Am. Acad. 22:153.

Culms erect, slender, scabridous under the heads, 2-5 dm. tall; leaves long-pointed, about 2 mm. wide, mostly shorter than the culms; spikes 5-15, light brown, ovoid, 3-7 mm. long, compacted in a globose or ovoid head, 1-1.5 cm. high; scales as long as the perigynia, brown, ovate-lanceolate, the midvein serrulate towards the acute or mucronulate tip; perigynia lanceolate to acutely deltoid, serrulate to the middle, nerveless, 3-4 mm. long, the flat beak about half the length of the body.

In wet meadows, Bear Valley, 6,500 ft. alt., in the San Bernardino Mts., Aug., 1882, June, 1894; 1573, 3271 Parish. North to British Columbia, and in the Rocky Mts. of Colorado and Montana.

Plate XXIII. Fig. i.

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Which Weighs the Most, the Egg or the Chicken which Comes From the Egg?

C. A. WHITING, SC. D., D. O.

This question has been guessed at a number of times, but I do not remember ever having seen exact data given in regard to the matter. With a view of answering the question with scientific exactness, Dr. J. O. Hunt, of Los Angeles, carried a fertilized and an unfertilized egg through the whole process of incubation with the results given below by the eggs indicated by A and C. More than a year after Dr. Hunt's experiments, I carried eggs B and D through the same treatment. The tabulated results are here presented.

Days.	A.	B.	C.	D.
1	.573 gr.	.590 gr.	.387 gr.	.552 gr.
2	.586	.603	.420	.586
3	.614	.608	.483	.563
4	.543	.601	.400	.574
5	.569	.594	.433	.583
6	.542	.602	.407	.356
7	.583	.593	.431	.394
8	.543	.595	.425	.399
9	.660	.599	.484	.400
10	.682	.594	.508	.409
11	.497	.714	.386	.658
12	.693	.693	.536	.649
13	.481	.654	.278	.603
14	.567	.633	.526	.559
15	.570	.622	.430	.587
16	.582	.601	.434	.503
17	.656	.594	.481	.501
18	.574	.602	.409	.409
19	.714	.604	.492	.386
20	.824	.603	.418	.351
21		.604		.309
22		.796		.250

Egg A weighed at beginning of incubation 59.76 g., and during the process of incubation lost 12.053 g., or a little more than 20 per cent.

Egg C, a sterile egg subjected to the same treatment, lost 8.768 g., or 15.5 per cent.

Egg B weighed at the beginning of incubation 62.842 g., and during the time of incubation lost 13.699 g., or 21.64 per cent. The chick hatched from the egg weighed 44.204 g., or 18.638 g. less than the egg before incubation, a loss of 29.65 per cent.

Egg D was so violently shaken previous to incubation that it was killed. Its treatment was the same otherwise as egg B. The loss of egg D during the time of incubation was 10.571 g., or a loss of 17 per cent.

A Visit to Rock Creek

*BY ANSTRUTHER DAVIDSON, C. M., M. D.

On May 30th, Dr. Hasse and I took the stage for Shoemakers' Ranch on Big Rock Creek, for a week's botanizing in the desert foothills. This creek lies about 30 miles east of Palmdale and drains a wide area on the northern slope of Mount San Antonio. At this time most of the annual vegetation on the desert proper was dried out, but on the foothills above the 4,000 feet level many species were still in flower. From Shoemakers a good wagon road now runs up the creek to the Lowell Mine, 7,000 ft. alt., along this way most of our collecting was done. Among the specimens gathered were two new varieties and the following species hitherto reported as not found in Los Angeles county:

Eriophyllum confertiflorum lariflorum, Gray, was very common, the woolly fruited form of **Layia heterotricha,** H. & A. frequent; **Linanthus androsacus breviculus,** Milligan, the most common Gilia on the foothills; **Linanthus concinnus,** Milligan, at 7,000 ft .alt.; **Ribes cerium,** Dougl., **Quercus kelloggi,** Newb., and **Amelanchier alnifolia,** Nutt., at 6,000 ft.; **Collinsia callosa,** Parish, was common; **Pyrola rotundifolia bracteata,** Gray, and **Melica stricta,** Bol., were found among the pines; **Aira elongata,** Hook., at a lower altitude. **Chorizanthe perfoliata,** Gray, is fairly common; the common Brickellia is probably **B. Wrightii,** Gray. One plant of **Pholisma arenaria** was found by Dr. Hasse a few miles out on the stage road. In Gray's Synoptical Flora this is said to be found from Monterey to San Diego and is said to be parasitic on the roots of Eriodictyon, clematis and oaks. A few years ago Prof. J. J. Rivers found some specimens in the sands where Ocean Park now stands. They appeared to him parasitic on the roots of **Croton california.** The plant named **Enothera cæspitosa** in my county list is **Enothera trichocalyx,** Nutt. A few specimens grow around Lancaster. **Montia spathulata,** Howell, once before found near Manzana, a station equally far south, was here not infrequent about 4,000 ft. alt., and higher up among the pines we gathered a very marked form with characters almost sufficient to warrant a specific name.

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*Read before Botanical Sect., Nov. 1, 1906.

Montia spathulata, Howell, var. **viridis,** n. var. Diffuse, procumbent, dark green; basal leaves greatly expanded at the base of the petiole, broadly spathulate or lanceolate-ovate 1-4 in. wide above; cauline leaves 1 in. long, very broad sessile, deeply obcordate for 1-3 its length; petals white or slightly pink 1 1-2 in. long; seeds as in the type. Readily recognized by its broad bracts, expanded petioles and dark green colour which it retains on drying. Type 1507. Hasse and Davidson in authors herbarium. Among pine woods 7,000 ft. alt., Big Rock Creek, Los Angeles County. Hall's 1245, June, 1899, near Old Baldy Mt.; and 2218, June, 1901, Onstatt's Valley, San Jacinto Mt., are evidently this same variety, though the cauline leaves are longer and less connate.

Near the mine along with **Phacelia davidsoni,** were found a few plants of small flowered **Phacelia,** which I could not identify. Mr. H. H. Bartlett of the Gray Herbarium identified it as a variety of **P. humilis,** T. & G., and kindly forwarded a specimen gathered on Mt. Greyback, by W. G. Wright, in 1880, that is identical with mine.

Phacelia humilis, T. & G., var. **lobata** n. var. Leaves all deeply lobed, the lower frequently pinnatifid, the calyx lobes linear spathulate; otherwise as in the type. Type 1491, Hasse and Davidson, June 7th, 1906, Lowell Mine, 7,000 ft. alt., Los Angeles County. Co-types of both varieties in Gray Herb., Cambridge.

Besides the above, we found new habitats for some plants at present considered rare in our district, such as **Cercocarpus ledifolius, Senecio ionophyllus,** Greene; **Syntrichopappus lemmoni,** Gray; **Eremiastrum bellicides,** Gray, and **Cysopteris fragilis,** L. **Enothera rutila,** Davidson, supposedly rare and local, near Shoemakers' we found abundant on loamy slopes on the creek and its tributaries. One tree of what may prove to be **Sambucus callicarpa,** Greene, was found.

SUN HEAT.

The following extracts are reprinted from the inaugural address of Professor John F. Lanneau, of Yake Forest College, North Carolina, on taking his seat as President of the Academy of North Carolina:

Facts in regard to the Sun's heat have been reached slowly because of peculiar difficulties due to the nature of heat.

It is not, as once held, the fourth form of elementary matter —earth, water, air, fire—nor yet, the subtile matter, "caloric", of a century ago. Indeed, though intimately associated with all forms of matter, heat itself is not matter.

It is force—energy—the force or energy of the constituent particles of either solids, liquids, or gases when the particles are in rapid motion—in minute, invisible, intense vibration. Matter may be opaque or transparent. We perceive its heat by the sense of touch. Heat is recognized not visually, but palpably. It is felt. As the feeling of warmth is the effect of the intense, invisible activity of the constitunt particles of matter, so that of coldness results from their inactivity—their stillness.

Every hot body tends to coldness because its hedged-in multitudes of agitated particles, by the resistance of their recurring collisions, gradually settle toward rest.

Meanwhile, the molecular vibrations, imparted to the adjacent all-pervading ether, are transmitted radially to distant bodies, communicating vibratory motion to their particles. Thus a cold body may receive radiated heat from a distant hot body.

Air waves bring us the musical vibrations of a distant bell, and its pleasing sounds are reproduced in our aural nerves.

Ether waves bring us the vibrations of a distant hot body, and its heat is reproduced in our tactile nerves.

AMOUNT OF SUN'S HEAT.

The elder Herschel was the first to investigate the universe of stars and nebulae. His illustrious son in 1838 took the first well directed step in the study of the Sun's heat. A sunbeam of known section, imparting its heat to a definite weight of water, raising its temperature an observed number of degrees, in a certain length of time, gave the coveted fundamental data: namely, the amount of heat received on a square foot of surface in one minute—taking as a unite of heat, the heat which raises a pound of water one degree Fahrenheit.

He found that the heat received at the Earth from the Sun in the zenith, is suffiicient to melt an inch thick layer of ice in two hours and thirteen minutes. That is, if an inch thick shell of ice encompassed the Sun, distant from its center in all directions ninety-three million miles that immense, remote ice shell would all be melted in two hours and thirteen minutes.

With Young, our highest authority on solar facts, fancy such an inch thick shell of ice kept intact and drawn inward toward the sun, all the while containing the same quanity of ice, becoming thicker as it lessens in size. When it touches the Sun's surface its thickness will exceed one mile.

That vast, solid glacier, embracing the Sun, at every point over one mile high, would all be melted by the Sun's heat in two hours and thirteen minutes. It would melt a layer about forty feet thick each minute!

All honor to Herschel's conception and achievement. His method was perfect, but not his instruments. Better means now prove that the Sun radiates from its entire surface in one minute enough heat to melt encasing ice sixty-four feet thick!

Temperature of the Sun.

Within experimental limits Stephen's thermal law holds, namely that the rate of heat radiation is as the fourth power of the absolute temperature. Assuming it to hold universally, this law and the known rate of the Sun's radiation—500 thousand units of heat per minute from each square foot of solar surface—give as the Sun's surface temperature 12,000° F, about sixty times the temperature of boiling water!

With much more certanity, a lower limit to the Sun's surface temperature has been found experimentally. Scheiner by ingenius use of the spectroscope, comparing lines of the solar spectrum with certain lines of magnesium, proved that the photosphere is hotter than the electric arc—that is, that its temperature is certainly above 7000°. F. So also, the heat at the focus of a powerful len has furnished a lower limit in a very realistic way.

The Sun's rays received on a lens or burning-glass are converged to its focus, producing at that point a high temperature. A point out in space to which the Sun's rays naturally converge at an angle equal to the focusing angle of the lens, may be termed the space-point of equal temperature. Its distance from the Sun is easily found, for the ratio of that distance to the focal length of the lens is the known ratio of the Sun's diameter to the lens' diameter.

At the focus of the largest lens yet constructed the high temperature produced instantly melted and vaporized the most refractory materials—platinum, fire-clay, carbon—everything tested. Its space-point of equal temperature is about two hundred fifty thousand miles from the Sun's surface—a little further from the Sun than the Moon is from us.

If then, our solid Earth were placed at that distance from the Sun—a quarter of a million miles—it would quickly melt, vaporize, vanish! That certainly is the temperature at one-fourth of a million miles from the Sun. Still higher is it at the Sun's surface—and inconceivably higher, the internal temperature.

Source of the Heat.

How does the Sun produce its enormous output of heat, and maintain its inconceivably high temperature? Of four theories to be considered—if the newest suggestion can be called a theory—only one is perfectly satisfactory.

1. The Cooling Theory.

It is certain the Sun is not simply an intensely hot body slowly cooling, for in that case, its materially lowered temperature after thousands of years of human history would have caused decided climatic changes, but we know that the vine the olive and the palm are fruitful now just where they flourished in the days of classic writers.

2. The Combustion Theory.

It is equally certain that the Sun is not simply burning up—that its heat does not result from ordinary combustion. As estimated by Young, its continuous great yield of heat could be produced by the consumption every hour of a layer of coal all over the Sun's surface nineteen fet deep. That is, by burning one ton of coal hourly on each square foot of the Sun's surface.

Lord Kelvin computes that were its vast mass solid coal environed by pure oxygen, and yielding its heat by combustion, it would be utterly consumed in five housand years. It would then, have dwindled more than one-third since Ptolemy's day. Yet in the nearly two thousand years elapsed, it has certainly not diminished appreciably.

3. The Radium Theory.

Though not produced by combustion, the Sun's heat is now surmised by some to be due largely if not entirely to radium—that most remarkable of known substances, discovered less than eight years ago by Mme. Curié. Proofs of its properties are ably presented in Rutherford's "Radio-Activity." It is not only self-luminous, but it is also self-heating, giving out every hour enough heat to melt more than its own weight of ice, a fourth more. It seems to be a very rare element. Tons of pithchblende yield only a few grains of radium. As radium evolves helium, and helium is known to be a chief component of the Sun's chromosphere, it is suggested that the Sun contains much radium.

Recall that the Sun radiates from its entire surface in one minute enough heat to melt encasing ice sixty-four feet thick. With this measure of the Sun's heat, and radium's heat emission per minute—melting one forty-eighth of its own weight of ice—as data, we readily find that the Sun's heat equals the heat emitted by a mass of pure radium weighing nearly as much as the whole Earth weighs. That much of this rare and peculiar element in the Sun— our world's weight of radium—would yield its known output of heat.

The surmise that such a quanity of radium is there, rather segregates the Sun from common matter. Moreover, the properties of radium are none too well known. At present therefore, attributing the Sun's heat to radium, is simply an interesting speculation.

4. The Mechanical Theory.

There remains for consideration the mechanical origin of solar heat—that is, the conversion of force, or the energy of moving matter into heat energy. There can be no doubt that many millions of metoric bodies are hourly falling into the Sun. We know that something like twenty million so-called shooting stars plunge into our atmosphere daily. Their checked energy of motion reappeares in the air as light and heat. But the heat thus imparted to our Earth in a year has been shown to be less than we receive from the Sun in one second! Incomparably more of such metoric bodies are continually plunging into the solar atmosphere. Nevertheless, they must contribute comparatively little to the Sun's heat, for while interplanetary space, at least as far out as the Earth's orbit, is threaded by a veritable maze of meteorids, if sufficiently more numerous throughout inner space to produce by their incessant impacts on the Sun a large part of its heat, the comparative density of the outlying myriads would affect perceptibly not only the periodic comets but also the planet Mercury. No such effects have developed.

Helmholtz's theory of the mechanical origin of solar heart—his contraction theory announced in 1853—fully accounts for the Sun's heat. Recall that the inward pull of gravity at the Sun's surface is nearly twenty-eight times gravity at the Earth's surface. Abundant evidence furnished by the spectroscope, and the Sun's known low density not much greater than that of water force the conclusion that the Sun is a vast sphere of commingling gases, among which many of our known vaporized terrestrial elements have been unmistakably indentified.

As the Sun contracts by its own powerful gravitation, the potential energy lost by gradual inward motion is replaced by equivalent heat energy. Every particle in the whole stupendous mass moving inward, contributes to the Sun's inconceivable aggregate of heat. Helmholtz computed that an annual contraction of two hundred feet in the Sun's diameter is sufficient to produce the heat it radiates. More accurate recent measurements of the amount of heat radiated, indicate a greater contraction—a lessening of the Sun's diameter by three hundred feet annually. This even, is so slight a change in that diameter of near a million miles that in seven thousand years will not appreciably alter the Sun's apparent breadth. Our present most exact heliometers could not then detect the change—a change in the Sun's angular breadth in seven thousand years of less than a single second! But as the Sun is a gaseous mass, its expanding force just counterbalanced by its gravitating force, it can contract only as its expanding force lessens by loss of heat radiated. Will it not then cool as it contracts? Not necessarily, for Lane's law, discovered about 1870, asserts the paradox that a globe of gas contracts by its own gravity and grows hotter, as necessary results of its loss of heat by radiation.

To illustrate:

Let $v =$ volume of a globe of gas; $p =$ its surface gravity, or pressure; and $t =$ its absolute temperature. When from loss of heat by radiation its radius contracts one-half, let v', p', t' represent respectively its changed volume, pressure, and temperature. Since volumes compare as their radii cubed, and surfaces as radii squared, v' will equal $\frac{1}{8} v$, and the surface of v' will $= \frac{1}{4}$ the surface of v. Since surface gravity increases as the square of the radius diminishes, the inward pull or pressure on the surface of v' will $= 4$ times what it was on the surface of v; and as

just shown, the surface of v' is only one-fourth that of v. Therefore, as a 4 times greater force will be exerted on a 4 times smaller surface, on a unit of surface the force or pressure on v' is 16 times the former pressure on v. That is, $p' = 16p$.

Morover, Mariotte's well-known law requires that for a body of gas: The products of its volume and pressure changes as its temperature changes.

$$\begin{aligned} \text{Hence, } & v \times p : v' \times p' :: t : t', \\ \text{or, } & v \times p : \tfrac{1}{8} v \times 16p :: t : t', \\ \text{or } & 1 : 2 :: t : t', \\ \text{or } & t' = 2t. \end{aligned}$$

Thus, when contracted to half its radius the globe of gas is twice as hot as at the outset. In general, as it radiates heat it contracts, and as it contracts it grows hotter.

If, then, our Sun is truly gaseous from center to surface, notwithstanding its vast output of heat it must, by contraction, continually grow hotter. If however, as is likely, the photosphere of incandescent clouds of carbon droplets and the central density have made it partly viscous, or partly liquid or even semi-fluid, then the heat produced by contraction may just equal that lost by radiation. In this case, the Sun's temperature will be constant—as probably it has been during the historic past.

With increased condensation, the heat of contraction will fail to replace that lost by radiation, and the Sun's temperature will lower more until it becomes cold, solid, dark!

When by contraction its present diameter is reduced one-half, its density will be increased eight-fold. It will doubtless be non-gaseous and will be cooling. Contracting still, cooling more, radiating less and less heat, it must finally fail to support any of the present forms of terrestrial life—the world we know will be dead!

It is somewhat comforting to learn from Newcomb and other eminent authorities that this had failure of our now glorious Day-Star, when its generous heat and light shall be quenched—our world's night of death—is probably distant in the future some ten million years!

*Flora of Clifton, Arizona

ASCLEPIADACEÆ.

Philabertia cynanchoides, Gray. Common. July.
Asclepias mexicana, Cav. Duncan. July.

GENTIANACEÆ.

Erythræa calycosa, Buckley. Metcalf. Aug.

POLEMONIACEÆ.

Gilia longiflora, Gray. Common. May.
Gilia aurea, Nutt. Coronado mine. May.
Gilia bigelovii, Gray. Fairly common. May.
Gilia floccosa, Gray. Ward's canyon. May.
Gilia polycladon, Torr. Sheldon. April.
Gilia inconspicua, Doug. Chase Creek. April.
Gilia leptomeria, Gray. Chase Creek. May.
Gilia aggregata, Spreng. Garfield.
Gilia multiflora, Nutt. Metcalf. Sept.
Phlox gracilis, Greene. Clifton. May.

CONVOLVULACEÆ.

Ipomea coccinea, L. Common. Sept.
Ipomea var. **hederifolia**, Gray. Sheldon.
Ipomea hederaceæ, Jacq. Not infrequent.
Ipomea costellata, Torr. Common on dry hills. Sept.
Convolvulus incanus, Vahl. Dry hills. Sept.
Euvolvulus argenteus, Pursh. Frequent.

SOLANACEÆ.

Solanum jamesii, Torr. Shady banks Blue River. Sept.
Solanum triflorum, Nutt. Clifton, rare. June.
Solanum nigrum L. Clifton.
Solanum nigrum nodiflorum, Gray. Blue River. Sept.
Solanum xanti var. Parish. Metcalf. July.
Solanum eleagnifolium, Cav. Clifton, probably introduced.
Chamæsaracha coronopus, Gray. Dry mesas. April to Oct.
Chamæsaracha sordida, Gray. With the last but more common.
Physalis pubescens, L. Clifton.
Physalis crassifolia, Benth. Frequent.
Physalis longifolia, Nutt. Metcalf. Sept.
Margaranthus solanaceus, Schlecht. Above 4,000 ft. alt. Common. Sept.
Lycium berlandieri, Dunal. Common at higher altitudes.
Lycium pallidium, Miers. Common. April.
Lycium andersoni wrightii, Gray. Very common.
Datura meteloides, LC. Clifton.
Quincula lobata, Raf. Frequent. April.
Nicotiana attenuata, Torr. Common.

Nicotiana trigonophylla, Dunal. Common.
Petunia parviflora, Juss. Guthrie. April.

SCROPHULARIACEÆ.

Linaria canadensis, Dumont. Metcalf. May.
Maurandia wislizeni, Engelm. Not uncommon. Sept.
Scrophularia glabrata, Davidson. Common on Frisco and tributaries above 4,000 ft. Metcalf is the type locality.
Pentstemon acuminatus, Dougl. Guthrie April.
Pentstemon puniceus, Gray. Common above 4,000 ft. alt. April.
Pentstemon linariodes, Gray. Common on shaded rocks.
Pentstemon barbatus, Nutt. Metcalf and Blue River.
Mimulus rubellus, Gray. River sands. May.
Veronica peregrina, L. Frisco River. May.
Castilleia lanata, Gray. Tanner's canyon. May.
Castilleia integra, Gray. Dry mesas. Johnson's ranch.
Castilleia minor, Gray. Metcalf.

OROBANCHACEÆ.

Aphyllon fasciculatum, Gray. Coronado mine. May.
Aphyllon multiflorum, Gray. Metcalf. Lordsburg.

BIGNONACEÆ.

Chilopsis saligna, Don. Very common on the river banks.

PEDALIACEÆ.

Martynia fragrans, Lindl. On rich bottom lands; the fruit is a pest.

VERBENACEÆ.

Verbena canescens, HBK. In alkaline ground Hachita. Sept.
Verbena wrightii, Gray. Common on Duncan plains and frequently perennial. May.
Lippia wrightii, Gray. Stream banks above 4,000 ft. alt. Sept.

LABIATÆ.

Salvia romeriana, Scheele. North Clifton. April.
Salvia ballotæflora, Benth. Common on the higher streams. Sept.
Salvia lanceolata, Willd. Whipple meadow. Sept.
Salvia subincisa, Benth. Garfield. Sept.
Salvia coccinea, L. Common in mountain canyons.
Salvia davidsoni, Grenman. Stream bank about two miles above Metcalf. Only two plants were found. Oct.

Trichostema arizonicum, Gray. Chase Creek. Sept.
Pycnanthemum californicum, Torr. Garfield. Sept.
Monarda fistulosa mollis, Benth. Chase Creek. May.
Hedeoma thymoides, Gray. Well distributed. April.
Hedeoma thymoides oblongifolia, Gray. Frequent. Sept.
Hedeoma drummondi, Benth. Common. Sept.
Conobea intermedia, Gray. Metcalf. Sept.
Cedronella wrightii, Greenman. This is fairly common in its type locality about 4,000 ft. alt. on Chase Creek and Blue River. Sept.
Dracocephalum parviflorum, Nutt. Mountain stream banks. April.

NYCTAGINACEÆ.

Mirabilis wrightiana, Gray. Common above 4,000 ft. alt. Sept.
Mirabilis multiflora, Gray. Very common.
Allonia incarnata, L. Common.
Allonia linearifolia, Kuntze. Widely distributed.
Allonia linearifolia nyctaginia, Michx. Frequent. Sept.
Abronia turbinata, Torr. River sands, Guthrie. April.
Boerhaavia scandens, L. Common.
Selinocarpus chenopodicides, Gray. Common on the Lordsburg plains.

POLYGONACEÆ.

Polygonum nodosum, L. Chinese gardens. Clifton.
Polygonum douglassi. Metcalf and Blue River.
Eriogonum abertianum, Torr. Frequent.

AMARANTHACEÆ.

Froelichia interrupta, Moq. Chase Creek. July.
Gomphrena cæspitosa, Torr. Chase Creek. April.
Amaranthus palmeri, Wats. Common.
Amaranthus fimbriata, Benth. Frequent.
Amaranthus blitoides, Wats. Coronado.

OFFICERS OF THE ACADEMY FOR THE YEAR, 1906-07.

President, B. R. Baumgardt.
First Vice President, J. D. Hooker.
Second Vice President, Dr. A. Davidson.
Secretary, Melville Dozier.
Treasurer, S. J. Keese.

BOARD OF DIRECTORS.

All the officers of the Academy and J. W. Badger, Geo. W. Parsons, Dr. C. A. Whiting, H. O. Collins, Wm. H. Knight, S. M. Woodbridge.

OFFICERS OF THE SECTIONS.

Astronomical.

Chairman, Wm. H. Knight.
Secretary, H. O. Collins.

Biological.

Chairman, Dr. C. A. Whiting.
Secretary, Dr. C. H. Phinney.

Geological.

Chairman, Geo. W. Parsons.
Secretary, G. Major Tabor.

Botanical.

Chairman, Dr. A. Davidson.

Agricultural and Chemical.

Chairman, Dr. S. M. Woodbridge.

Standing Committees.

Publication—Dozier, Davidson, Ulrey.
Program—Whiting, Knight, Collins.
Finance—Keese, Badger, Parsons.

TRANSACTIONS

Astronomical Section.

The regular meeting of the Astronomical Section was held Monday evening, October 15, 1906, at the residence of Prof. Melville Dozier, on Eleventh Street.

Mr. Knight read an interesting paper upon the newly discovered planet T. G., which was first detected upon a photograph plate at Konigstuhl on March 3, 1906, and seen through the refractor at Vienna on March 5, 1906, by Palisa.

Its orbit has a striking similarity with that of Eros, as it lies five gears within, and seven gears without the orbit of Jupiter.

HOLDRIDGE O. COLLINS, Secretary.

GEOLOGICAL SECTION:

The opening meeting of the Geological Section of the Academy of Sciences of Southern California was held at the Casa de Rosas Auditorium Girls Collegiate School, Adams and Hoover streets, on Monday, Oct. 22 at 8 p. m. An address was given by Professor W. L. Watts, his subject being Geological Notes on some portions of Oaxaca, Mexico. He described the geological features of the Northern and Central portions of Oaxaca, and their bearing on the mineral deposits of the territory which was the subject of his discourse.

He said that the portion of the Sierra Madre Oriental ranges which he visited in Oaxaca are composed mainly of hydro-mica schist with some ridges wherein the prevailing formation is syenitic granite, both the syenitic and schist are traversed by dykes of intrusive rock, and contain veins carrying silver and a little gold. The silver being principally in the form of pyrargarite, i. e., sulphantimonide of silver.

Mr. Watts regards portions of the Sierra Madre Oriental ranges as the oldest formations in Oaxaca.

The central portions of Oaxaca he found to be composed principally of granitic rocks showing a gneissic structure. These crystalline massives are overlaid by sedimentary and eruptive rocks. The granitic rock of this series contain veins of free milling gold ore, and in some places veins carrying copper, gold and silver are found.

Prof. Watts stated that in the Taviche District several mines of great merit are being developed, and that it is probable that the Taviche District will become one of the most important mining districts of Mexico. In this district the veins are fissure veins and veins of segregation and infiltration. The wall rock is andesetic lava. Professor Watts stated that it is quite likely that some of the veins would eventually be found to go down into the granitic rocks underlying the lava. A general discussion followed the close of the meeting and Professor Watts gave much interesting detail concerning his experiences, of 18 months in the heart of Mexico.

GEO. W. PARSONS, Chairman.

BIOLOGICAL SECTION.

The Biological Section of the Southern California Academy of Sciences held its first meeting of the year, in the Histological Laboratory of the Pacific College of Osteopathy. The meeting was called to order by the Chairman of the Section, Dr. C. A. Whiting, who made some announcements in regard to the coming meetings of the Section.

The minutes of the last meeting were read and approved.

Prof. L. H. Miller of the State Normal School was introduced and in a most interesting manner spoke of the structure and life history of a specimen of Salamander, Autodax, lugubris, found in Los Angeles. This animal is one of a species never before found south of the Tehachapi.

The talk was illustrated by a large number of fine pen drawings of the animal and its species at all stages of its development.

Twenty-three members and visitors were present.

No business being presented, the meeting was adournd upon motion to meet at the regular time.

CARLE H. PHINNEY, Secretary.

The regular October meeting of the Biological Section of the Southern California Academy of Sciences, was held in the Histological Laboratory of The Pacific College of Osteopathy. The meeting was called to order by the Chairman of the section.

The minutes of the last meeting were read and approved.

The chairman called for voluntary reports upon scientific subjects. Dr. Whiting reported that this year marks the fiftieth anniversary of the discovery of coal-tar stains, and spoke of its influence upon the discoveries in biology and its great commercial value.

Prof. Ulrey was called as the speaker of the evening, who announced as his subject, "Some Problems of Inheritance." The talk was one of great interest and value. Prof. Ulrey suggested that inheritance depends upon the presence in the nucleus of the cell of zymogens; and that when the nature of proteid and the nature of zymogens are known, the problems of inheritance will be much more clear.

Questions were asked concerning some phases of inheritance which were discussed by several present. Twenty-five members and visitors were present. On motion the meeting was declared adjourned to meet at the regular time.

CARLE H. PHINNEY, Secretary.

MEETINGS OF THE BOARD OF DIRECTORS.

October 1, 1906.

The first regular meeting of the Board of Directors was held this evening at Symphony Hall. Present, Messrs. Knight, Parsons, Keese, Collins, Whiting, and Dozier. In the absence of the President, in Europe, Mr. Knight presided.

The result of the election of officers and appointment of committees was read and approved. The Treasurer gave a statement of the condition of the treasury, upon which the Secretary was instructed to request the collector of dues to furnish the Treasurer with a full and correct list of the members, together with their standing as to payment of dues. Other matters of interest were discussed without action, and the meeting adjourned.

MELVILLE DOZIER, Secretary.

November 5, 1906.

At the meeting of the Board of Directors this evening those present were Messrs. Knight, Collins, Parsons, Whiting, and Dozier. Mr. Knight presided. Mr. Ralph B. Clapp, of Alhambra, was proposed for membership, duly recommended, and upon motion was duly elected. There being no other business the meeting adjourned.

MELVILLE DOZIER, Secretary.

PROCEEDINGS OF THE ACADEMY.

Symphony Hall, October 1, 1906.

At the monthly meeting of the Academy this evening, Mr. Geo. W. Parsons presided by request. He announced the meetings of the several sections for the current month, and then introduced Mr. Wm. H. Knight, the speaker of the evening, whose topic was "The Panama Canal, the Plans Adopted and the Engineering Features." By means of maps and a carefully prepared paper, Mr. Knight gave in a very lucid form, the history, present status, and future outlook of this greatest of the world's enterprises; dwelling particularly upon the great significance of the large artificial lake to be constructed on the route, which will act as a safeguard against overflows and consequent damage in times of torrential rains, and also provide ample water for the operation of the locks.

MELVILLE DOZIER, Secretary.

Symphony Hall, November 5, 1906.

At the meeting of the Academy this evening the subject under discussion was "The Engineering and Commercial Features of San Pedro Harbor", presented in an address by Lieutenant Randolph Miner, U. S. N. The speaker was introduced by Chairman Wm. H. Knight in fitting terms and proceeded to describe the great work projected and now being accomplished at the harbor of San Pedro. The design is to construct a harbor of wide entrance, thoroughly protected from the ravages of storms from the southwest and the southeast, not less than forty feet deep at low water, and capable of accommodating two hundred and fifty ships at anchor.

The speaker entered into particulars, aided by charts, concerning the design, the cost, the capacity, the concessions to private and corporate parties, the progress and the possibilities of the great undertaking, and predicted a harbor of vast commercial value to the world, provided with ample facilities for loading and unloading, repairing, and constructing vessels of the largest type, bringing Los Angeles into direct touch with the great commercial centers of the world.

The address was replete with interest and elicited much discussion and questioning tending to elucidate still further this subject of such vital importance to this City and State.

A rising vote of thanks was heartily tendered to Lieutenant Miner for his valuable contribution to the knowledge and entertainment of the Academy.

MELVILLE DOZIER, Secretary.

ASTRONOMICAL SECTION.

The monthly meeting of the Astronomical Section was held at 825 West Eleventh street, on Monday evening, Nov. 19, 1906.

Professor Dozier read a paper on the "Sources of the Sun's Heat" by Prof. J. F. Lanneau, President of Wake Forest College, North Carolina, originally presented before the North Carolina Academy of Sciences at Raleigh on May 18, 1906.

HOLDRIDGE O. COLLINS, Secretary.

BOTANICAL SECTION.

The Botanical Section met at 544 Wilcox Building. Dr. Davidson read a paper and showed some specimens of plants gathered on a recent trip to the Mohave district T. PAYNE, Secretary.

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